THE GAS JOURNAL

APRIL 11, 1934

Vol. 206. 86th Year No. 3699

A Glance at the Contents—

Index to Vol. 205.

As a supplement to this week's issue of the "JOURNAL" is published the Index to Vol. 205, covering the January-March quarter of this year.

Mains and Fittings Superintendent.

The Morley Corporation Gas Department invite applications for the above position at a commencing salary of £190 per annum. [p. 102.]

Coke Production in Horizontal Practice.

In a paper before the Yorkshire Junior Gas Association, Mr. J. K. Mitchell, Assistant Engineer and Manager of the Brighouse Corporation Gas Department, discussed the subject of coke production in horizontal retort practice. [p. 96.]

Visual Comparison of Gas and Electricity Practice.

It is proposed shortly to arrange for production of models by a well-known firm in the Industry to convey generally a comparison between the two industries concerned in the supply of light and heat energy from a national and economic angle. [p. 85.]

North British Association.

The Presidential Address is published of Mr. Lewis Bain, of Cullen and Banff, before the North British Association of Gas Managers. [p. 91.]

Industrial Gas Showroom at Stratford.

A photograph gives a view of the industrial gas showroom at the new premises of the Gas Light and Coke Company at Stratford. [p. 80.]

New Coke Screening and Grading Plant at Wandsworth.

An interesting coke screening and grading plant capable of dealing with 30 tons an hour of coke from the intermittent vertical chamber plant and a horizontal retort house has recently been put into commission at Wandsworth Gas-Works. [p. 83.]

Gas at the Ideal Home Exhibition.

Gas plays as large a part as ever this year at the "Daily Mail" Ideal Home Exhibition at Olympia. The service which gas can render in the modern "ideal home" is most ably demonstrated by the London Gas Exhibit and many well-known firms. [p. 86.]

Forthcoming Engagements

April 12.—MIDLAND JUNIOR ASSOCIATION.—Meeting. Paper by Mr. F. H. Bate.

April 14.—WESTERN JUNIOR GAS ASSOCIATION.—Annual General Meeting at Bath.

April 18.—B.C.G.A.—Meetings of Executive Committee 11.30 a.m.; General Committee 2.30 p.m., at 28, Grosvenor Gardens, S.W. 1.

April 19.—S.B.G.I.—Council Meeting at 2.30 p.m.

April 19.—SOUTHERN ASSOCIATION (WESTERN DISTRICT).—Commercial Meeting at Devonport.

April 20.—B.C.G.A.—Annual Meeting of Salesmen's Circles, Caxton Hall.

April 20.—INSTITUTION OF MECHANICAL ENGINEERS.—Meeting at 6 p.m. Paper on "Gas-Works Practice" by Mr. F. M. Birks.

April 21.—YORKSHIRE JUNIOR ASSOCIATION.—Meeting at Rotherham. Paper by Dr. Heathcote.

April 21.—WALES AND MONMOUTHSHIRE JUNIOR ASSOCIATION.—Annual General Meeting at the Hotel Metropole,

April 21.—WESTERN JUNIOR ASSOCIATION.—Meeting at Bath. Presidential Address.

April 26.—SOUTHERN ASSOCIATION (EASTERN DISTRICT).—Meeting at 28, Grosvenor Gardens, S.W. 1, 2.30 p.m.

April 26.—MIDLAND JUNIOR ASSOCIATION.—Annual Meeting. Address by Mr. R. S. Ramsden.

April 30.—I.G.E.—Meeting of Liquor Effluents and Ammonia Sub-Committee, 2.30 p.m.

May 1.—I.G.E.—Meetings of Joint Research Committee, 10.30 a.m.; General Research Committee, 2.30 p.m.

May 4.—NORTH OF ENGLAND ASSOCIATION.—Annual Meeting at the County Hotel, Newcastle-upon-Tyne, 2 p.m. Swansea, 5.30 p.m.

May 4.—LONDON AND SOUTHERN JUNIOR ASSOCIATION.—Annual Business Meeting.

May 9.—MANCHESTER AND DISTRICT JUNIOR ASSOCIATION.—Visit to Mossley. Paper by Mr. T. Hibbs.

May 9.—S.B.G.I.—Annual General Meeting and Dinner, Hotel Metropole, London.

May 10 & 11.—EASTERN COUNTIES GAS MANAGERS' ASSOCIATION.—Spring Meeting at Cleethorpes.

May 12.—SCOTTISH EASTERN JUNIOR ASSOCIATION.—Annual General Meeting and Paperette Day in Heriot Watt College, Edinburgh.

May 17.—MIDLAND ASSOCIATION.—Spring General Meeting at Leamington.

May 17.—WALES AND MONMOUTHSHIRE ASSOCIATION.—General Meeting at Cardiff.

June 5-8.—I.G.E.—Annual General Meeting, London.

EDITORIAL NOTES

Watch the Supply Side

TO-DAY the Gas Industry expects a higher standard of education from those engaged on the engineering side than from those on the distribution and supply side. Proof of this is to be found in the number of students taking courses at the educational centres. The number of supply students is wholly disproportionate to the number of engineering students. This is a grave mistake, and the Industry must do something about it. Inefficient producing stations will gradually be closed down, and the fight against competition will be on the district, not in the retort house. We emphasized this in the "JOURNAL" a fortnight ago, and we are glad that Mr. Lewis Bain, in his Address last Friday as President of the North British Association of Gas Managers, pointed again to a state of affairs inimical to the interests of the Gas Industry. The remedy, of course, lies in the hands of the present executives of gas undertakings. They must offer more encouragement, by way of opportunity and pay, to the supply man to regard the Ordinary Grade Certificate of the Institution Education Scheme as the first step in training—and not as a goal. We shall have to concentrate more energy on work on the district. The time has already arrived in certain areas of supply when an overhaul of the distribution system is essential before a sales push can be attempted. Which means that heating and water heating business is being lost. Again, ugly fitting work is regarded far too tolerantly. The need for well-trained supply men is apparent, and money spent on this training is wise expenditure.

It is obvious that the adequate education of the personnel of the Industry is dear to Mr. Bain's heart, and we hope that what he had to say at Perth last Friday will encourage those who are inclined to be apathetic in this regard to take a keener interest in the Education Scheme and to play an active part in furthering its purpose. On a matter of detail in connection with the Scheme, Mr. Bain suggests that too many ancillary subjects are included in the approved courses of study, and that "concentration on the essential basic subjects would be an advantage and prevent an inclination on the part of students to look upon the ancillary subjects as secondary." We do not quite get the meaning of the phrase "essential basic subjects;" perhaps Mr. Bain will make this clear. But we feel sure that too much insistence cannot be laid on the vital importance of training in what are unfortunately termed "ancillary" subjects. The O.E.D. defines ancillary as "subservient, subordinate," and many students do in fact regard ancillaries with scant respect. Yet they are the foundations on which the special structure of the technique of gas making, distribution, and utilization is built.

In the report of the Board of Examiners of the Education Scheme for 1933 it is stated that "in many cases candidates did not apply the knowledge gained in the study of ancillary subjects when answering questions in the main subjects of gas engineering and gas supply . . . lack of knowledge of chemistry and physics limits a candidate's ability to deal with the modern problems of gas distribution and utilization." The criticism in the report is a criticism of ancillaries and not of main subjects. In this connection we recall the remarks of Dr. Long, Principal of the Westminster Technical Institute at last autumn's research meeting of the Institution of Gas Engineers. The Institute, by the way, has provided 50% of the whole of the trainees in the country—this refers specially to gas supply, not to gas engineering. Dr. Long suggested that the Industry will not get well-equipped employees by emphasizing the main subject. His experience is that one never finds a student who has done brilliantly in the ancillaries and who has not done well in the main subject.

The Straight-Line Chart

IN his address Mr. Bain includes a highly interesting table indicating the progress made by small gas undertakings—seven undertakings selected at random—since the introduction of electricity in their areas of supply, and in every case there has been a large increase in gas sales. To quote an example, one undertaking which made 47½ million c.ft. in 1923, the year in which electricity was introduced, has in the ten following years increased its make by 111·6%, the production in 1933 being 100½ millions. The success of the smaller gasworks in face of competition, as shown by the table, would not have been achieved unless attention had been paid to the quality of the gas supplied; and those undertakings which as yet have the field to themselves cannot afford to wait for the advent of electricity before directing effort towards ensuring uniformity of supply. Electricity has many faults, but when it is there it is at a constant potential—a defined voltage. This is electricity's most important advantage and it has had its due effect on the public.

It is axiomatic that any gas supply should at the consumers' premises be at ample and uniform pressure and of constant quality. Small works find it harder to maintain this aim than do large undertakings. Stop-end horizontals, hand stoked, are not the ideal plant for securing a straight line on the calorific value chart of the make into holder. Also it is usual practice to dilute the straight coal gas. This question of dilution is one which should be studied carefully by the smaller undertakings. It is definitely bad practice to introduce inert gases into the coal gas to reduce the calorific value. The alternative is, of course, dilution by water gas. Until recently the installation of water gas plant was regarded by the small undertaking as a proposition put out of court on the score of capital cost and labour charges. New plant is now available, however, which puts an entirely different complexion on the matter. In the "JOURNAL" last week we described a completely automatic water gas plant—the first of its kind to be put into operation in this country—of a nominal capacity of 60,000 c.ft. a day, at a works where the labour consists simply of one stoker per shift. This plant was erected by Messrs. Davison & Partner, Ltd., and is proving eminently satisfactory. All the advantages of flexibility of operation and control of the coke market have been gained without adding to labour charges.

An automatic water gas plant of a different type—this the first of its kind in Scotland—has been installed by Messrs. Humphreys & Glasgow, Ltd., at Banff, and the description of its working given by Mr. Bain in his address should appeal to those in charge of smaller undertakings. It has resulted in more efficient carbonization, more accurate control of the quality of the gas supplied to the town, and control of the coke market. Mr. Bain makes the interesting observation that where coal has a high transport charge this cost is considerably reduced by transforming the coke into gaseous therms. In the North of Scotland the railway dues for coal vary from 10s. to 13s. per ton, and use of coke made on the works for gas production has commercial advantages.

There is no doubt that these automatic water gas plants will prove of the utmost benefit to small undertakings, particularly in view of the clauses of the Government Gas Undertakings Bill which relate to non-statutory undertakings. Mr. Bain remarks that some who direct

small companies may resent the restrictions which will be imposed when the Bill is enacted, but quite rightly maintains that any such objection cannot fairly be defended. As we have often emphasized, the strength of the Gas Industry depends on the strength of each link in its chain of service—upon the efficiency of each individual undertaking.

Holding Companies

THE important question of amalgamation is touched upon by Mr. Bain in his address. He maintains that much remains to be done by merging the small with the larger undertakings, or in a holding company, and he points to the advantage of being able to purchase materials on more favourable terms. "If well managed, there is scarcely any aspect of gas manufacture or supply which would not ultimately show very considerable economies by the formation of a holding company. . . . Throughout the country centralized administration and control by large holding companies have proved to give rise to material economies, greater than had been anticipated." To our mind a holding company is justified only if it results in better service to the consumer. It has yet to be proved that holding companies *per se* will, by saving in bulk purchasing, actually effect substantial reduction in the prices of gas. A holding company is not a magic formula, and its aim will be defeated if it results in any slackening in effort of the individual undertakings concerned. Indiscriminate centralization should be regarded with disfavour.

On the other hand, there is the obvious need for greater regional co-operation in the Industry in order to afford the consumer up-to-date service, and in this respect well-planned amalgamations—always with this object in view—can help in very many ways. In the matter of staff training, for instance, the benefits of amalgamation have already been appreciated by the consumer, and in the industrial field more perhaps than any other the value of the small undertaking having at command the resources of the large cannot be lightly dismissed. Where amalgamation scores most is that it can concentrate on work on the district in a manner which the average small concern finds impracticable. In all this we presuppose a nucleus of highly skilled research and an established and well-organized training section. It is in the development of this nucleus to the best advantage that amalgamation should prove useful. It would, however, be a very bad thing for the Gas Industry if its members were under the impression that the formation of a holding company in itself is a bulwark against competition.

In the Headlines

NOBODY in our Industry believes that we are deficient in material of "headline" interest, yet how seldom, as compared with our chief rival, do we appear as "news," with the full publicity value which such appearances carry. It is constantly being said on all occasions that we must impress on the public that we are alive, virile, and modern. What the man in the street reads in the news columns of his daily paper he believes. He may pretend to his friends that he doesn't, but the Press is still our chief source of information on current events. The moral for the Gas Industry is obvious.

When we talk of headlines, we do not necessarily mean sensations, nor the untimely ignitions of various gaseous mixtures in subterranean ducts of all kinds which are as a matter of course labelled "gas explosions." We have in mind at the moment a short news item which appeared recently in the London *Evening News*. "Watching a Modern Gas-Works Operating" was the headline. (Do the public all know that there is such a thing as a *modern* gas-works?) Then, after two subheads, the article described how crowds of youngsters who had visited the Science Museum at South Kensington at Easter had been absorbingly interested in a new working model just installed there. And there followed a brief interview with the Secretary of the Museum on the subject of the Gas Light and Coke Company model which was described recently in our columns.

Congratulations again to the Gas Light, but on this occasion congratulations particularly to whoever was responsible for the article in question, because articles like this do not often just "happen." Why does the Gas Industry not obtain more of this very desirable kind of publicity? One reason may be that it is not universally understood that there is a very specialized technique in writing up news stories for the daily Press. The B.C.G.A. understand this well enough, and for all we know they may have a service for dressing news items for member undertakings in a garb acceptable to newspapers. If not, it is a branch of activity they might well consider. In any case it can be taken for granted that wherever a newspaper is published there is an editor waiting for news, but he probably spends so much time rejecting the items received in a dull and unsuitable style that he has no time to write-up even the most interesting in a form which his readers would accept. Equally it can be taken for granted that for every editor there are several journalists who have studied the technique of writing news stories acceptable to the editor, and who spend their lives looking for news to write-up. Not every gas undertaking can keep its own Press correspondent; on the other hand, writing for the Press is no amateur's job, while the expert will produce a readable story from a very slender beginning. We do seriously urge a much bigger effort to get into the news. On the lines indicated it costs nothing. The editor pays.

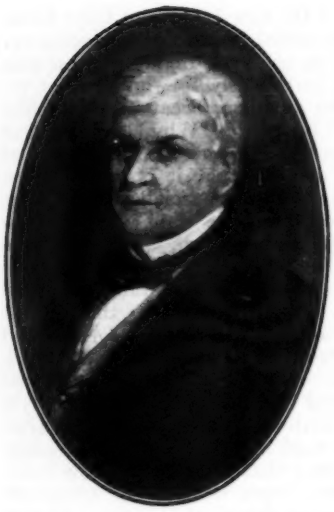
Gas at Olympia

AT no time in our history has the business of home making been more emphatically a matter of national interest. Many millions of money are being invested by those who are, first and foremost, owner-occupiers, while the Government, in co-operation with local authorities, is planning to spend over a period of five years no less than £115,000,000 to offer life in more healthful and hopeful surroundings to the class of workers whose circumstances and conditions of employment render it impossible for them to undertake the obligations of ownership.

No effort has been spared at the *Daily Mail* Ideal Home Exhibition, which remains open for the whole of the present month, to bring into Olympia's many halls all the latest developments, discoveries, inventions, and Empire products affecting every interest in the home. And in this respect the Gas Industry may justly feel proud of the display which has been staged on its behalf in the Lighting and Heating Section by the London Gas Exhibit Committee and by many well-known individual firms of appliance manufacturers. After the British Industries Fair one has come to expect at the Ideal Home Exhibition the next most comprehensive co-operative display by the Industry—and this year is no exception. An article on later pages of this issue describes the gas exhibits generally, and it may truly be said that all the most up-to-date appliances for the modern "ideal home" are displayed, while the Industry's response to the present call not only for more labour-saving apparatus, but also for more colour in the home, is particularly notable. That the Industry can at the same time produce settings to harmonize with any interior colour scheme and with any "period" decorations from the Tudor to the ultra-modern is also emphasized; while on the cooking and water heating sides the ability of gas automatically to look after the housewife's requirements is a striking testimony to the progress Mr. Therm has made in recent years.

We could have wished to see more gas apparatus in the model homes of the Housing Section, but the *Woman's Journal* House does provide an example of what gas can do, in every direction except lighting, in the modern house, the automatic gas-fired central heating installation being perhaps the most interesting feature. Altogether the London Gas Exhibit Committee and the other firms are to be congratulated upon their very fine display on behalf of the Industry at this most popular of the country's annual exhibitions.

Eighty-Five Years of the "JOURNAL"



THOMAS G. BARLOW

WILLIAM B. KING

THE change in the Editorship of the *Journal*, which took place with the beginning of the current volume, as forecast in our issue of Jan. 3, recalls to mind the fact that Walter Rupert King, who now becomes Editor, has had only five predecessors in office in all the eighty-five years of the Paper's service to the Industry. The last three holders — Walter King, Arthur F. Bezant, and Alfred Harrison — have been known personally to so many who are still active in the Industry that we feel their photographs here reproduced will interest a wide circle. The inclusion of William B. King carries the family interest further back than most of our readers will remember, but even so the story would not be complete without Thomas Greaves Barlow—a very eminent engineer in his day, to whose foresight the Gas Industry owes the complete record, technical and historical, of its career almost from birth, which is written in two hundred and five volumes of the *Journal*.

Thomas Greaves Barlow, who in his day designed and constructed numerous gas-works, not only in the British Isles, but also on the Continent and in America, established the *Journal of Gas Lighting* at the beginning of 1849, in the stormy days when rival interests were contending for the gas supply of London. For nearly a quarter of a century, until his death in 1872, as Proprietor and Editor, he successfully carried on the paper, never failing to urge upon Gas Companies any line of policy which, though it might not always be palatable, he conceived would be to their real advantage, and would ultimately secure them the support of the public.

WALTER KING

It was in the time of his successor, William Boughton King, at the beginning of the year 1874, that the *Journal*, previously in succession a monthly and a fortnightly publication, began to appear weekly, so that it has now completed sixty years in that form. W. B. King, who was contemporarily described as one of the most expert reporters on the London Press, was publisher of the *Journal* until Barlow's death, when he became Editor. He was for long a familiar figure at the meetings of the British Association of Gas Managers—the forerunner of the Institution—and at the half-yearly gatherings of the Metropolitan Gas Companies. When the time came to write his obituary, it was stated that "the publication of the 'Treatise on the Licence and Practice of the Manufacture and Distribution of Coal Gas' was solely due to his enterprise, and the latter work will, we anticipate, carry down his name to many generations of future Gas Managers." That has happened, for "King's Treatise" is still well-known in the Industry.

William B. King's knowledge of gas affairs was said to be unrivalled. He knew the history of almost every undertaking, and his advice was often sought when parliamentary proceedings were pending. Many still active members of the Industry will be prepared to pay the same tribute to his son, Walter King, who became Editor on William King's death in 1878, and carried on untiringly almost till his own death in June, 1922.

To Arthur Bezant, and subsequently to Alfred Harrison, fell the privilege of following in these sure footsteps, and each witnessed a steady expansion of the business that was started nearly a century ago.

ARTHUR F. BEZANT

ALFRED HARRISON

THE NEWS OF THE WEEK

"**Gas-Works Practice**" is the title of a paper by Mr. F. M. Birks which will be discussed at a meeting of the Institution of Mechanical Engineers on Friday, April 20 (6 p.m.).

The South-Eastern Gas Corporation announce that their offer (noted recently in the "JOURNAL") to acquire the ordinary share capital of the Herne Bay Gas Company, Ltd., has been accepted by a large majority of the latter's shareholders, and has, therefore, become effective.

Recent Elections to the Institution of Chemical Engineers include the following: To Associate-Membership, Mr. E. S. Edmiston, B.Sc., of the Brisbane Gas Company; and to Graduateship, Mr. G. U. Hopton, B.A., B.Sc., of the Gas Light and Coke Company, and Mr. P. Stripp, B.Sc., of the same Undertaking.

The Proceedings of the Senior Associations for the year 1933 are now available in book form, at the "JOURNAL" Office, price 11s. 3d. post free. The volume contains the reports of meetings of the nine Associations of Gas Engineers and Managers, and presents in compact form a great amount of technical information on subjects vital to the Gas Industry.

Eastern Counties Association.—The eighty-seventh half-yearly meeting of the Eastern Counties Gas Managers' Association will be held at Cleethorpes on Thursday, May 10. The Cleethorpes Gas-Works will be inspected in the morning, and luncheon will be held in the lecture hall of the gas showrooms, where the business meeting will follow at 3 p.m. under the Presidency of Mr. F. G. Brockway.

The Electricity Undertaking of the Torquay Corporation invites tenders for the supply of 2,500 tons of coke breeze to the Newton Abbot power station, at the rate of 100 tons per week, deliveries to commence at once. Alternative tenders are also requested for gas and industrial coke. Tenders have to be delivered to the Engineer and Manager, Mr. G. J. Hollyer, at the Electricity Offices, Upton Valley, Torquay, not later than 12 noon on April 19.

Edinburgh's Increased Gas Consumption.—For the past month, the Edinburgh Gas Department report shows a record gas output. During last month, the Department sent out 352,922,000 c.ft., compared with 328,202,000 c.ft. for the same period last year, representing an increase of 7·53%. On one day the increased demand was as high as 2 million c.ft. The quality of the gas supplied was 475 B.Th.U. per c.ft., this being the statutory declared value under the Gas Regulation Act. The previous largest output for the month of March was 330,068,000 c.ft., this being supplied in March, 1932.

Gas Exhibition at Newmarket.—Improvements are constantly being made in gas appliances; and the Newmarket Gas Company lose no time in bringing those improvements to the notice of their consumers. A gas exhibition, with cookery lectures by Miss E. D. Crossland, Diplomée N.C.T.S. (of Radiation, Ltd.), was held recently in the Gas Company's showrooms, Town Hall Buildings. The exhibition was open daily from 10 a.m. until 8 p.m., while the cookery demonstrations began each day at 3 p.m. and 7 p.m. The exhibition was opened by Mrs. Horace Crisswell, who was briefly introduced by Mr. J. H. Troughton, J.P., Chairman and Secretary of the Gas Company.

Many Members of the Gas Industry—especially in the North—who happened to be listening on the wireless last Saturday evening to the second of the "Owt about Owt" magazine series of talks from the North Regional Station of the B.B.C., doubtless recognized a very familiar voice when the "Medical Officer of Health" of the world-famous "Ancient Order of Henpecked Husbands," gave a talk on that body and its 5,914th annual secret conclave in the wilds of Boulderclough on Easter Monday. Among the vast host of rules which a "Henpeck" member may not break on pain of dire penalties is the disclosure of his identity; but if members of the Gas Industry could hardly fail to recognize the voice of Alderman J. H. Waddington, ex-Mayor of Halifax, Chairman of the Halifax Gas Committee, can the unfortunate "Medical Officer" himself be blamed for disclosure?

B.I.F. Date Change.

Birmingham in May—London Keeps to February.

The Department of Overseas Trade announces that the Birmingham Section of the British Industries Fair, 1935, will be held from May 20 to May 31 inclusive. The London Section will, however, as formerly, open on the third Monday in February—*i.e.*, Feb. 18, 1935.

This decision follows a recommendation of the *ad hoc* Committee of representatives of the London and Birmingham Sections of the Fair set up by Col. John Colville, M.P., Secretary to the Department of Overseas Trade, to consider the question of the date of the Birmingham Section.

Co-Partnership at Cardiff.

The report of the Co-Partnership Committee of the Cardiff Gas Light and Coke Company for the year ended Dec. 31, 1933, states that the sum allocated by the Company to co-partnership in respect of the year 1933 was £7,268 12s. This, together with the balance brought forward from 1932, enables the Directors to announce a bonus distribution of £7,307 7s. 1d., equal to 7½% upon co-partners' wages and salaries, and £101 6s. 4d. is carried forward to next year's accounts.

Interest amounting to £584 3s. 5d. has been credited to co-partners' cash accounts. Co-partners' deposits in the co-partnership savings account during the year amounted to £1,911 14s. 8d., an increase of £143 5s. 4d., over the year 1932. The Committee note with pleasure that the amount of cash withdrawals is less by £318 10s. 2d. than last year, despite the larger amount included in respect of group life insurance premiums—namely, £538 19s. 11d.—for a full year's payment, compared with £182 0s. 4d. for four months of 1932.

The stock acquired by co-partners during the year amounted to £3,385, at a cost of £3,602 13s., which includes £915 14s. 5d., transferred from cash accounts for this purpose upon signed requests received. These transfers were effected at the price of £105 2s.%, which has proved to be a very favourable figure in view of the current market value of the ordinary stock of the Company.

Mr. H. S. Brown (Mains and Services) and Mr. A. Whitlock (Bute Terrace Station) retire from the Committee by rotation, and have been re-elected to represent their respective sections.

Visit to Refractories Works.

On Saturday last members of the Scottish Junior Gas Association (Eastern District) visited the Castlecary Works of Messrs. J. G. Stein & Co., Ltd., where many well-known brands of refractories are manufactured. On arrival, the members were welcomed by Col. Stein and Mr. Alan Stein.

In the research laboratories many types of furnace and apparatus for the checking of raw materials and finished products were seen. The mine from which the various brands of clay are brought is 60 fathoms below the works, and the clay occurs in deep strata up to 30 ft., the different qualities occurring in separate layers. Blasting has to be resorted to in mining the clay, which is then elevated to the surface by a winding engine. It passes into a dry crushing mill and then into a wet mill, where a certain percentage of "grog" or old brick is added to form a bond. Overhead buckets convey the plastic clay to machines where it is pressed into the required shapes. These shapes are then placed on a steam-heated floor for drying off, different times and temperatures being required, depending on the quality of the refractory.

The dried bricks are then transferred to a kiln (one of which is 1,000 ft. long) for burning off. This process takes about three weeks and consists of the batch of bricks being gradually heated from cold to maximum temperature and gradually cooled again to cold. They are then ready for shipment or stock.

Silica and firebrick gas retorts are made at these works, and large stocks of various shapes were inspected. For

THE NEWS—continued.

special shapes, hand-moulding is used, and these processes, in both fireclay and silica, were witnessed. The pattern shop, where both wood and steel patterns are made, was visited, also the electrical generating plant and engine rooms.

At the conclusion of the visit, the party had the experience of seeing and hearing a lantern lecture by Mr. R. Malcolm, B.Sc., A.I.C., which was given inside one of the kilns. During the course of his talk, Mr. Malcolm outlined the methods used in the laboratory for ensuring a consistent quality product and emphasized the various properties of the different refractories.

The members were entertained at tea, after which Mr. A. J. Doran, Granton Gas-Works, conveyed to Messrs. Stein, Mr. Malcolm, and staff their thanks and appreciation for the interesting visit, lecture, and hospitality. Col. Stein replied, and expressed the pleasure it was to have the Association at their works.

Drought Menace to Boilers.

A warning to all users of boilers of dangers arising from the water supplies available during drought was given by Mr. George S. Irving, A.M.I.Chem.E., when reading a paper on Boiler Water Treatment to the South Wales Section of the Society of Chemical Industry and the Institute of Chemistry at the Technical College, Cardiff.

"During times of drought," said Mr. Irving, "feed waters are liable to increase greatly in hardness, and 'foaming' may occur owing to the greatly increased amount of suspended matter in the boilers. I never cease to wonder why the authorities in factories where live steam is used in process work do not fit large external steam separators. No one would dream to-day of using electrical machinery not provided with fuses as a safety precaution. Similarly, where live steam is used in process work, adequate precautions should be taken."

Mr. Irving emphasized the importance of obtaining steam as free as possible from other substances, by the correct conditioning of boiler feed water, and added that the quality of the steam, as distinct from the quantity, was not given sufficient attention.

It was thought by some sufficient, he said, to supply boilers with water which had been "softened," but the "conditioning" of boiler feed water only began with the water entering the boiler. This showed that the removal of hardness was not the beginning and end of its treatment.

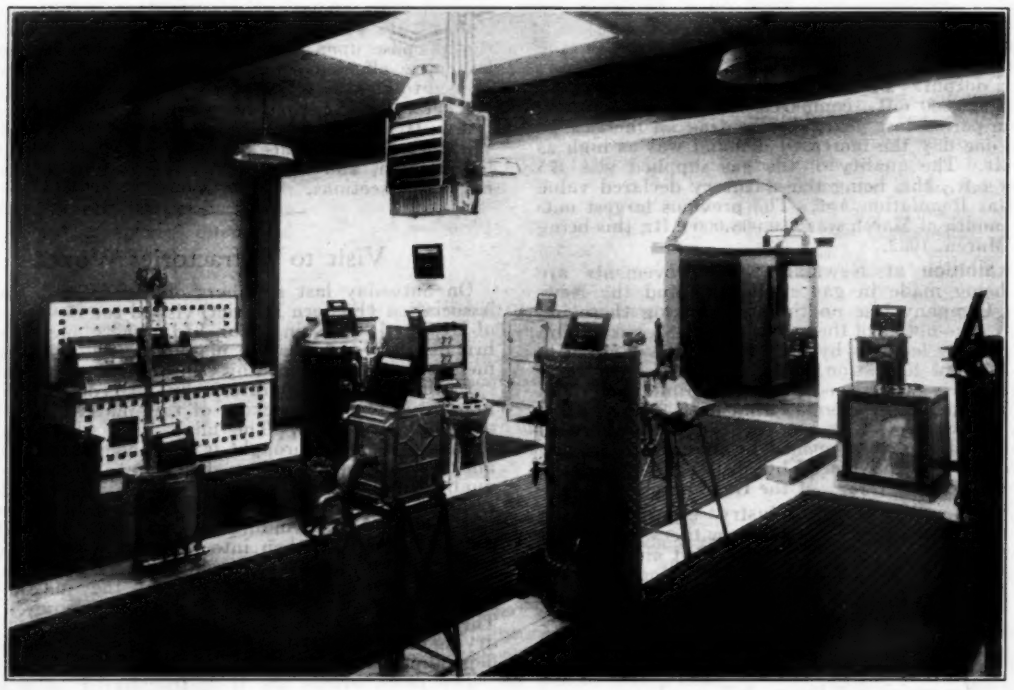
It had been found that the use of a colloid, blended with other suitable ingredients, gave a rational treatment which proved remarkably effective.

Speaking of the variety of problems associated with boiler feed water, Mr. Irving pointed out that those awaiting solution included: (1) Physical chemistry of solutions as they occur in boilers, extending the work of Hall. (2) Solubility of substances found in boiler waters between pressures of 100 lbs. and 1,000 lbs. to the sq. in. (3) An extension of our knowledge of the corrosion of boilers, and their auxiliaries, since no one theory of corrosion at present fully accounts for same. (4) The heat conductivity of different types of boiler scales (extending the work of Partridge), and including scales containing oil. (5) Velocities of water in different parts of boilers and their relation to corrosion, and the formation of scale at such parts.

It was hoped that greater interest would be taken in these subjects, and research work carried out by chemists and chemical engineers, so that this country, pre-eminent in engineering, would not lag behind in original work on boiler feed water chemistry and associated subjects. With increasing boiler pressures, exact information on these matters was becoming more and more necessary.

Reference is made in the paper to the solubility of calcium sulphate and calcium carbonate at boiler pressure, and to the decomposition of soda ash. Particulars of the heat conductivity of different types of scales are referred to and interpreted in terms of fuels and the manner in which scale forms in boilers, and details of sedimentation or settling tests of materials which form boiler sludges are given.

An Industrial Showroom at Stratford



It was mentioned in the "JOURNAL" for March 28, in connection with the opening of the Gas Light and Coke Company's new showrooms at Broadway, Stratford, that a feature of the premises was the inclusion of a comprehensive industrial section, where industrialists in the district will be able to see how gas can help them in their many and varied processes. Our photograph gives a general view of this showroom, and indicates the method adopted of displaying the industrial appliances which were described in the article.

THE NEWS—continued.

SIR ARTHUR DUCKHAM MEMORIAL FUND

Official List of Donations from March 31 to April 6

The Committee hope to be in a position to endow a "Duckham Research Award," to be applied for the period and purpose of specified investigations of interest to the Gas Industry, at places, at home or abroad, selected as being appropriate for the conduct of each particular investigation. Subscribers, therefore, are not only paying a tribute to the memory of Sir Arthur Duckham, but are also assisting to strengthen the Gas Industry at a critical period of its development.

Name and Town.	Amount. £ s. d.
Joseph Becker, Pittsburgh	20 0 0
F. M. Birks, O.B.E., London	1 1 0
John B. Black, Pittsburgh	20 0 0
Bernard F. Browne, Santos	5 0 0
James Campbell, Dunfermline	1 1 0
"Cheyham" (417)	1 1 0
Charles Cooper, Huddersfield	1 1 0
A. Wallace Cowan, Edinburgh	1 1 0
Croydon Gas Company	52 10 0
R. & J. Dempster, Ltd., Manchester	15 15 0
John de Villiers, Whites, O.F.S., South Africa	1 1 0
G. Le B. Diamond, Folkestone	1 1 0
George Dixon, Nottingham	2 2 0
Dover Gas Company	10 0 0
Dudley, Brierley Hill, and District Gas Company	10 10 0
Falk, Stadelmann, & Co., Ltd., London	25 0 0
M. Duckham Foster, Trinidad	2 2 0
Glasgow Corporation Gas Department	100 0 0
Great Grimsby Gas Company	10 10 0
F. A. Greene, London	5 5 0
G. J. Greenfield, Chapeltown	1 0 0
Miss L. Gregory, London	0 5 0
Halesowen Gas Company	3 3 0
Helensburgh Town Council	3 3 0
Houghton-le-Spring District Gas Company	3 3 0
Hyde Gas Company	11 7 0
James Jamieson, Edinburgh	2 2 6
Stephen Lacey, London	3 3 0
J. MacPherson, Cupar	1 1 0
Manchester District Association of Gas Engineers—Lancashire Commercial Section	25 0 0
J. Neath, Staines	1 1 0
Newhaven Gas and Coke Company, Ltd.	2 2 0
Otley Gas Company	4 0 0
Port Talbot Corporation	10 0 0
Power-Gas Corporation, Ltd. Ashmore, Benson, Pease, & Co., Ltd., Stockton-on-Tees	10 0 0
H. B. Rust, Pittsburgh	20 0 0
W. F. Rust, Pittsburgh	20 0 0
City of Salford Gas Sub-Committee	53 8 0
W. J. Sandeman, Croydon	1 1 0
County Borough of Stockport Gas Department	40 0 0
B. B. Waller, Stroud	3 3 0
Warrington Corporation Gas Department	18 8 6
Wellington Tube Works, Ltd., Tipton	10 10 0
Western Junior Gas Association	2 2 0
Weston-super-Mare Gaslight Company	21 0 0
Donations (45) paid above	£ 556 4 0
Donations (390) paid previously	7,662 1 0
Total Donations (435) paid	£8,218 5 0
Donations (14) promised	945 8 6
Total Donations (449) paid or promised	£9,163 13 6

Co-Partnership Meeting at Chester.

Steady Progress Reported.

The Chester United Gas Company now has the record number of 150 co-partners, whose Annual Meeting was held at the works recently.

Mr. Richard Former, who presided, reported that as the Directors had allocated £1,483, it would be possible to pay a bonus at the rate of 6½%, which was higher than in any previous year. Co-partners would be aware of the great rise in the value of the Chester gas stocks, the result of which was that ordinary stock would realize from £122 to £125%. Any applications now made for stock would be dealt with at £110 for each £100 stock.

"It is very encouraging," he said, "that over £7,800 of the Company's stock, of a value of nearly £9,400, is held by present and past co-partner employees, and, in addition to that, the present bonus balances reach a total of £4,200. The past year has been a busier one than any before. Mains are being laid in every direction to all the new property that is being erected; additional supplies are being connected every day, and a great number of gas appliances are constantly being fixed.

"We do not fear competition so long as it is fair; in fact, it can be beneficial. The Gas Industry, encumbered as it has been by antiquated legislation, needs greater freedom; and a little in that direction, but not nearly sufficient, is promised from a Bill which has quite recently been introduced in Parliament."

Gas and Electricity in Lincoln.

Forceful Remarks of Gas Committee Chairman.

Writing in the *Lincolnshire Echo* of March 28, Mr. Arthur L. Bower, Chairman of the Lincoln Corporation Gas Committee, ably replied to a statement which the Corporation Electrical Engineer was reported to have made a few days previously as follows: "Once upon a time the Corporation had trams, but they scrapped them owing to the march of progress. In a few years time they will do the same with the gas undertaking."

It seems hardly necessary to point out, said Mr. Bower, that the trams referred to were electric and scrapped on account of their unreliability and uneconomical working, as the Transport Department, who are still saddled with the burden, realize only too well.

The trams were superseded by petrol and not by any ingenuity of the electrical wizard. It is also rather significant that gas is being looked to as a possible solution of the legacy left behind.

With regard to the latter portion of the above remark. The same prophecy has been made on many occasions since the advent of electricity, the wish, however, being father to the thought.

As I have had to contend with similar observations from responsible persons who should have known better, as Chairman of the Gas Committee, I feel it incumbent on me to place before the public a few real facts relating to the Gas Industry and the Lincoln Undertaking in order to combat these misleading statements.

Standing on Their Own Foundation.

Having given a number of striking figures indicative of the progress and standing of the Industry, Mr. Bower went on to emphasize that the Gas Industry and the Lincoln Undertaking have been established well over a century, and have always stood upon their own foundation. The State has had to come to the aid of electricity and subsidize to the extent of no interest being paid on capital outlay until the end of 1935. Users may have a rude awakening when interest on many millions has to be found.

The relative position of the two industries can be better appreciated if I give figures relating to the Gas, Light and Coke Company, London, which is the largest Gas Company in the world. Its maximum hourly output of gas was on Sunday, Feb. 19, 1933, when it reached the stupendous figure of 18,489,000 c.ft., or 92,445 therms during the cooking hour. To send out this quantity of thermal energy in one hour would require an electrical power station 20 times the size of the largest electrical generating station in their area—namely, Barking.

The foregoing facts should indicate how ridiculous it is to talk of gas being altogether superseded by electricity, and I can only assume such outrageous statements are made with the deliberate intention of misleading the public. Evidently the City Council is not given credit for their foresight in bringing the gas-works up to date (one of the most modern in the country) so as to be in a position to meet the State-aided competition.

It may be the job of the electrical industry to get electricity into every house, but in this connection I do feel

THE NEWS—*continued.*

truly sorry for the poorer people (many unfortunately out of work) who have been deluded into changing over from gas. Unfortunately, I am afraid they will be sadder and wiser after paying for their experience.

In conclusion, may I point out that the citizens of Lincoln are interested in the trading departments of the Corporation as a whole, and would derive no satisfaction whatever from the knowledge that any undertaking was not progressing.

The Chairman of the Electricity Department has already stated there is a danger of the Central Board taking over the Lincoln undertaking, so it would appear there is a far greater possibility of this Undertaking ceasing to exist as a municipal enterprise.

My personal opinion is, both these competitive industries should continue to make progress side by side, largely because of the public demand for better social conditions. easier work for the household, and an improvement of the atmosphere in our city.

My final word of advice is to " Get up to date with gas " and " save the difference."

Gas Preferred to Electricity at Hereford.

At a recent meeting of the Hereford City Council the question of the improved lighting of Commercial Road was discussed.

It was reported that the Lighting Committee had seen an experimental lamp erected by the Gas Department. There had been some question as to whether the illuminant for the road should be gas or electricity, but the opinion was expressed that after the demonstration by the Gas Department members of the Committee were filled with enthusiasm for lighting the road by gas.

It was, therefore, decided by the Committee that the road be lighted by gas in preference to electricity.

Gas Undertakings' Small Bore Rifle League.

Final League Table, 1933-34.

We publish below the final League Table for 1933/34 of the Gas Undertakings Small Bore Rifle League.

—	Shot.	Won.	Lost.	Drawn.	Points.	Aggregate
Portsmouth	14	13	1	..	26	8 168
Beckton " A "	14	11	3	..	22	8,154
Hull " A "	14	8	4	2	18	8,063
Tottenham	14	6	7	1	13	7,996
Beckton " B "	14	6	8	..	12	7 813
Harrogas	14	6	8	..	12	7,671
Hull " B "	14	2	11	1	5	6,633
Cambridge	14	1	11	2	4	7,890

The highest average scores have been registered by the following:

L. Harvey	(Beckton " A ")	98·4	(13 matches)
H. Hooper	(do.)	98·21	(14 ,,)
A. Carlton	(Hull " A ")	98·1	(14 ,,)
P. De Greichy	(Portsmouth)	98·4	(5 ,,)

Possibles have been scored by the following Clubs:

Beckton " A "	9	Hull " A "	4
Portsmouth	8	Beckton " B "	1
Harrogas	4		

National Road Safety Campaign.

"Safety First" Association's Plans.

Following upon the announcements of Mr. Oliver Stanley, Minister of Transport, as to the action the Government proposes to take to secure greater safety on the roads, and the assistance which it is giving to the " National Road Safety Campaign " launched on March 29 by the National " Safety First " Association, that Association has issued a statement outlining its plans.

Briefly, these consist of a combination of local safety activities with a publicity campaign based upon the Highway Code. Local safety organizations are being established, under the ægis of the Local Authority, in some 300 centres where the majority of accidents occur. Week by week for the next six months some important point from the Highway Code will be selected, and public attention directed to it by posters, articles in the Press, and wireless notices. The badge of the campaign, the well-known red triangle, will be issued in the form of a small transparency, suitable for attachment to vehicles. Supplies of this badge will shortly be available at the leading motor garages, and will be issued free of charge. Every motorist who desires to promote greater safety on the road is requested by the Association to display this badge.

The campaign will extend throughout the summer, the period during which most accidents occur. On May 9, 10, and 11 the National Safety Congress will be held at the Park Lane Hotel, London. It will be opened by the Minister of Transport. H.R.H. the Duke of York, the Patron of the Association, will be in the Chair at a dinner on the evening of May 10.

The first poster of the campaign reproduces an autographed message from the Duke of York which reads: " Every day 600 citizens are killed or injured on our roads, mostly because of somebody's thoughtlessness. This message to you is the commencement of the National Road Safety Campaign to reduce these dreadful casualties. To avoid accidents, be courteous and alert. Give special consideration to the aged, the infirm, and the very young. The Highway Code is a code of good road manners. Let us all loyally observe it, and make the spirit of goodwill the keynote of our behaviour on the roads."

Thirty thousand copies of this poster are being distributed for display all over the country.

Dalkeith and its Lighting Costs.

The question of whether gas or electricity should be used for the lighting in connection with the housing scheme was under consideration at a meeting of the Town Council of Dalkeith last week, when the Council had offers before them.

It was pointed out that to make a fair comparison of gas with electricity, there should be added to a fixed charge for electricity of 50s. per year the cost of current used, which at the rate of 1d. per unit would be at least 12s. making a total cost of £3 2s. per year, as against the sum of £1 13s. 9d. for gas. The letter also stated that gas gave a circulation of fresh air in a room and destroyed many germs.

A further letter relating to the street lighting of the portions of Dalkeith in which gas was in use stated that the Gas Light Company were desirous of co-operating with the Council towards effecting a higher standard of lighting than at present existed. It was stated that the Company would take custody of the street lighting equipment, and provide all lamps not so fitted with a clock-controller, would remove all defective supply pipes, and supply the gas and mantles, and provide efficient lighting for the season from Sept. 1 to April 16 each year from dusk to 11 p.m. at the price of £2 5s. 5d. per lamp. All-night lamps burning till daylight would cost £2 17s. 4d. annually. These prices would be for a period of seven years. The meeting decided to refer the letter to the Lighting Committee for their consideration.

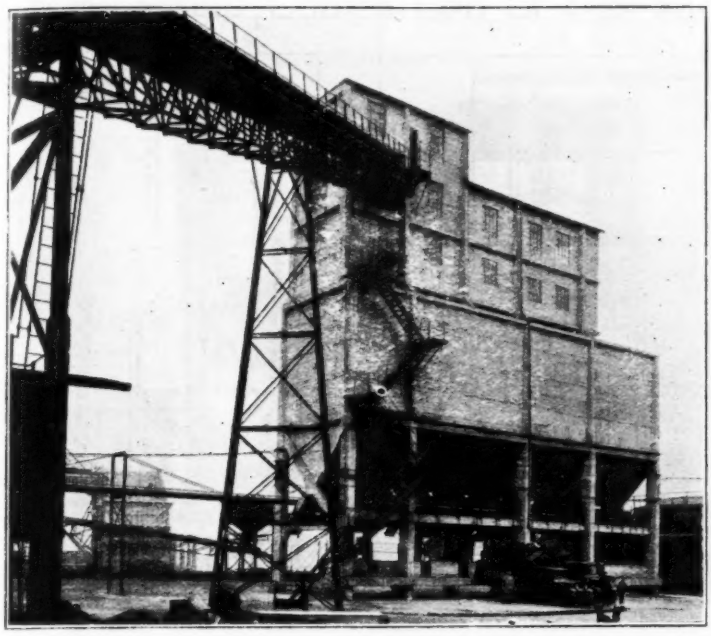
Gas *via* the Vinegar Bottle.

At a meeting of the Stockport Rotary Club, Mr. T. Claye informed the members that his grandfather, Mr. Thomas Claye, was the first man to introduce gas to Stockport. " Until a few years ago, I was the possessor of the original plant with which he made gas," said Mr. Claye. " He had a retort in the cellar, and the gas flowed into a vinegar bottle, and was used to light the shop window of his premises in Lower Hillgate. He was an Alderman and was later the Chairman of the Stockport Gas Committee."

Documents in the possession of Mr. Claye state that his grandfather first used gas for lighting purposes in 1815. The gasholder consisted of a treacle hogshead. " One light was formed of a vinegar bottle pierced through at the bottom to admit a lead pipe, and a burner was in place of the stopper," a letter states. " The light caused great interest, as the flames apparently issued from no substance that could be seen. The shop was lighted regularly until 1820, when the plant was sold for £10."

Mr. T. Reynolds, the Stockport Gas Engineer, the author of a paper on " Pollution " read at the meeting, was unable to attend owing to being laid aside by an attack of pneumonia. His paper was presented by his Chief Assistant, Mr. R. L. Greaves. [We are glad to learn that Mr. Reynolds has recovered from his illness. He recommenced his duties last week.—Ed. " G.J."]

In the course of his address Mr. Reynolds referred to the Stockport Gas-Works. Gas was first made there in 1821. The Corporation took over in 1838, when there were 7½ miles of main in the town and five public lamps. To-day there are 270 miles of main and 4,370 lamps. In 1859 (the earliest record Mr. Reynolds could find) the amount of gas made was 90 million c.ft.; to-day it is 1,200 millions.



General View of the Graded Coke Storage Hoppers and Bagging Platform.

NEW COKE SCREENING AND GRADING PLANT AT WANDSWORTH

On the occasion of a visit to the Wandsworth Works of the Wandsworth and District Gas Company last October, we referred in the "JOURNAL" to the fact that a coke screening and grading plant, capable of dealing with 30 tons per hour, was in course of erection.

This plant is now in full operation, and we were afforded the opportunity recently of inspecting the whole installation in detail under the guidance of Mr. Rawle, the Company's Coke Superintendent. The methodical layout and foresight shown in the design are particularly notable, giving a logical and mainly automatic sequence of travel to the product from the carbonizing plant to the bagging of the various grades of coke.

The plant has been installed to meet the demand for clean coke, and it embodies all the most modern features of present-day screening practice. As stated, it is capable of dealing with a main throughput of 30 tons of coke per hour, as received from one bench of horizontal retorts carbonizing 80 tons per diem, and two benches of intermittent vertical chamber ovens, carbonizing a total of 300 tons per diem. Both of these houses are served by telphers for coke-handling, and to enable advantage to be taken of the existing plants a reinforced concrete reception hopper lined on the inside with 1-in. thick blue Staffordshire tiles has been provided, and situated in such a position that either of the two telphers can discharge coke into it. The hopper has a self-filling capacity of 50 tons of coke, but with trimming this capacity can be increased to 100 tons, and a platform has been provided for this purpose,and at the same time will enable additional quenching of the coke to be carried out as found necessary.

THE CONVEYORS.

Three 30-in. wide belt conveyors, arranged to suit the existing site conditions, connect this reception hopper to the main screening plant, which is mounted directly above a battery of reinforced concrete hoppers having a storing capacity of 500 tons of graded coke.

Coke is fed to the first of the band conveyors from any one of the six outlets in the reception hopper, these outlets being provided with rack and pinion doors, so that the hopper can be effectively isolated in case of fire, and as a safeguard against serious damage all the conveyor belts are constructed of special heat resisting material. The first conveyor, which is horizontal, is driven by means of a 2 B.H.P. motor, and delivers the coke to the second conveyor, which is inclined.

Due to the layout of the site it was necessary to break this conveyor, and provide a transfer tower for connecting to the third conveyor, which is also inclined and feeds direct to the main screening plant. It was decided to take advantage of this transfer tower for incorporating a scalping screen between the junction of the two conveyors. This screen, which, together with No. 2 conveyor, is driven by a 7 B.H.P. motor is of the "Pegson Telsmith" high-speed vibratory single-deck type 8 ft. long by 3 ft. wide, with 1½ in. square mesh, which eliminates all coke 1½ in. and under. This undersize coke is deposited in a mild steel storage hopper lined with Staffordshire tiles situated in the transfer tower, while the oversize coke passes forward to No. 3 conveyor, and thence to the main screening plant. The undersize coke is further screened at the outlet of the storage hopper, by means of a 4 ft. by 3 ft. Pegson "Live-Wire" single-deck vibratory screen, driven by a 2 B.H.P. motor, which separates the breeze under ¾ in. from the 1½ in. coke. The oversize coke—*i.e.*, ¾ in.-1½ in.—is used in the mechanical producers of the intermittent chamber oven plant, and the breeze below ¾ in. provides fuel for the chain grate furnaces of the water tube boilers.

MAIN SCREENING PLANT.

The main screening plant receives coke all over 1½ in. from No. 3 conveyor, which is driven by a 5 B.H.P. motor. This coke is immediately passed over an 8 ft. by 3 ft. single-deck vibratory primary screen where all coke below 2 in. is eliminated, and passed forward for further screening, as described later. The oversize coke—*i.e.*, over 2 in.—can be dealt with in two ways according to demand—first, by passing it direct to its storage compartment, or alternatively by putting it through a Jenkins two-roll coke cutter, with an output capacity of 25 tons per hour, reducing the coke to 2 in. and under, whence it joins the undersize coke, already eliminated by the primary screen, and passes forward for further screening. The primary screen and the coke cutter are both driven from one 15 B.H.P. motor, and the cutting rolls are built up of manganese steel toothed cutters and cast-iron distance pieces.

The 2 in. and under coke as delivered from either the primary screen or coke cutter is carried forward, via a 20 in. wide belt conveyor to an 8 ft. by 3 ft. single-deck vibratory secondary screen, which eliminates all under 1⅛ in., the oversize—*i.e.*, 1⅛ in.-2 in.—passing direct to its storage compartment by means of a chute. The undersize coke—*i.e.*, under 1⅛ in.—is directed from the secondary screen by means of a chute to a third screen, which is also an 8 ft. by 3 ft. size, similar to the previous screens, except that it is fitted with two screening decks. The top deck passes over all coke ⅜ in.-1⅛ in., which is led to its respective storage compartment, by means of two 20 in. wide belt conveyors. The coke which passes through the mesh of the top deck—*i.e.*, ¾ in. and under—is again screened on the bottom deck which then separates the breeze under ⅜ in., and directs the two gradings to their respective storage compartments by means of chutes. The second and third screens together with the three 20 in. belt conveyors are all driven from one 7 B.H.P. motor.

STORAGE BUNKERS.

The storage bunkers into which the final sizes of graded coke pass are five in number, and are of reinforced concrete lined with tiles. The capacities are as follows: Large screened coke (over 2 in.), 140 tons capacity; broken screened coke (1⅛ in. to 2 in.), 133 tons; coke nuts (⅜ in. to 1⅛ in.), 80 tons; forge nuts (⅜ in. to ¾ in.), 58 tons; and

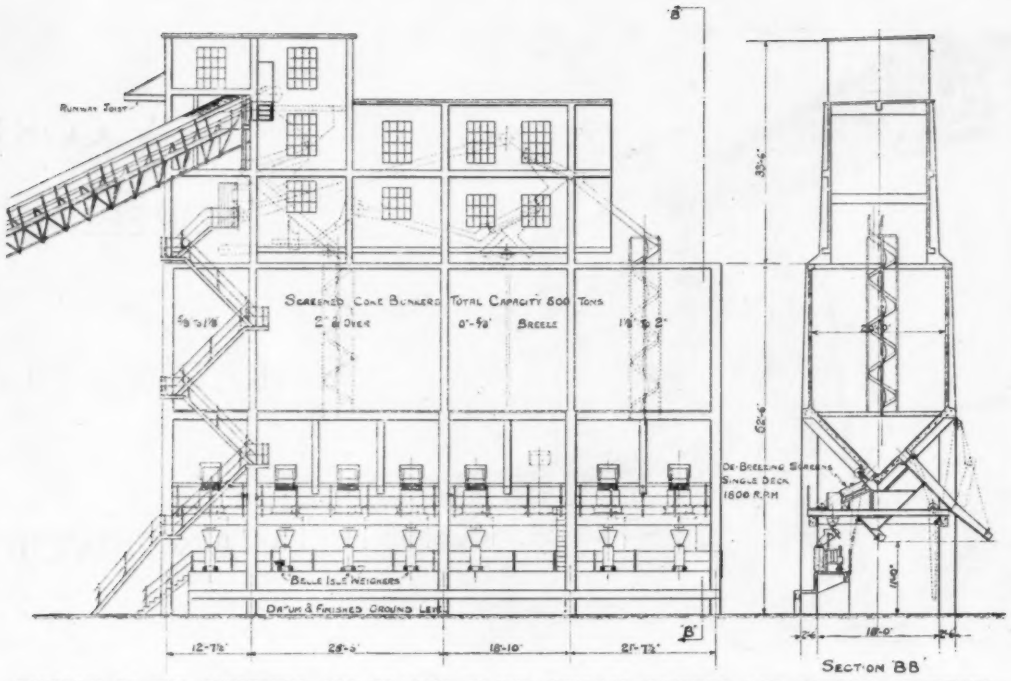


DIAGRAM OF THE SCREENING AND GRADING PLANT, STORAGE HOPPERS, AND BAGGING PLATFORM.

breeze (0 in. to $\frac{3}{8}$ in.), 58 tons. The bunkers are provided with fifteen outlets in all—eight for road vehicles and seven for bagging.

Special precautions have been taken in connection with the design of the transfer chutes, so that breakage of the coke is reduced to a minimum, and spiral lowering chutes have been incorporated in the storage compartments for the two largest grades of coke. Furthermore, the large coke is eliminated in the initial stages, thus ensuring maximum screening efficiency.

The whole of the screening plant is housed in concrete which forms a continuation of the storage bunkers, ample light and ventilation being provided, and also commodious access platforms, with interconnecting staircases, in addition to an easy flight of stairs from the ground level. The housing is also provided with a lifting block girder and large doors, so that replacements can be readily brought to the plant when necessary.

Interlocking Device.

To prevent any possibility of choking once the plant has been started at the reception hopper, the whole of the motors driving the plant as described, with the exception of the one for the de-breezing screen at the outlet of the hopper in the transfer tower, are arranged in sequence, thus ensuring that the various units of the plant are started up in the right order, and also that the plant is put out of action should any one motor fail.

Although considerable care has been taken to obtain clean coke up to this stage, it is only to be expected that breeze will be formed in the storage compartments, and as it is essential that perfectly clean coke should be offered direct from the bunkers especially in the case of bag coke, additional de-breezing is provided for at the bunker outlets.

For the purpose of bag loading, each outlet, excepting of course the breeze compartment, is provided with a 4 ft. by 3 ft. single deck vibratory screen, which eliminates all breeze below $\frac{1}{2}$ in., the oversize passing over the screen to a receiving hopper, from where it is weighed in "Belle Isle" machines and bagged. An interesting feature in connection with the bagging operations is the double tier platform which obviates the necessity of lifting the bags, when transferring to road vehicles, and enables an output of 12 tons per hour to be comfortably maintained.

The de-breezing screens are driven from one 10 B.H.P. motor from a common lineshaft through clutches, hand operated from the bagging platform.

For lorry loading, hinged chutes are provided on the opposite side of the bunker cones, and in this case the chutes are fitted with static screens (except in the case of the breeze compartment) in the bottom for eliminating the breeze. The breeze from the de-breezing screens (both vibratory and static) are deposited in mild steel hoppers, provided with outlet valves for periodical emptying.

The cones of the reception hopper, main storage bunkers, breeze hopper at transfer tower, sides and bottoms of all chutes throughout the plant are lined with blue Staffordshire tiles to minimize the abrasive action of the coke.

The motors are of the totally-enclosed variety, and the starters of the heavy-duty type with the wiring carried out in C.T.S. cables brought from one central point.

Every consideration has been given to the construction of the plant to reduce breakage to a minimum, to provide against the abrasive action of the coke and to produce an exceptionally clean graded product.

The plant, which has been manufactured and installed by Messrs. W. J. Jenkins & Co., Ltd., of Retford, was designed to the instructions of Mr. C. M. Croft, Chief Engineer and General Manager of the Wandsworth and District Gas Company, and it is anticipated that it will be successful in the way of producing a coke not only acceptable to the Company's present customers, but which will also attract new sources of revenue.

Cutting of Steel by Oxy-Coal-Gas.

A paper covering the two subjects Cutting of Steel by the Oxy-Coal-Gas Process and Electric Welding was read before a meeting of the West of Scotland Branch of the Association of Mining Electrical Engineers by Mr. G. M. Buchanan, of Messrs. Mavor & Coulson, Ltd., Glasgow.

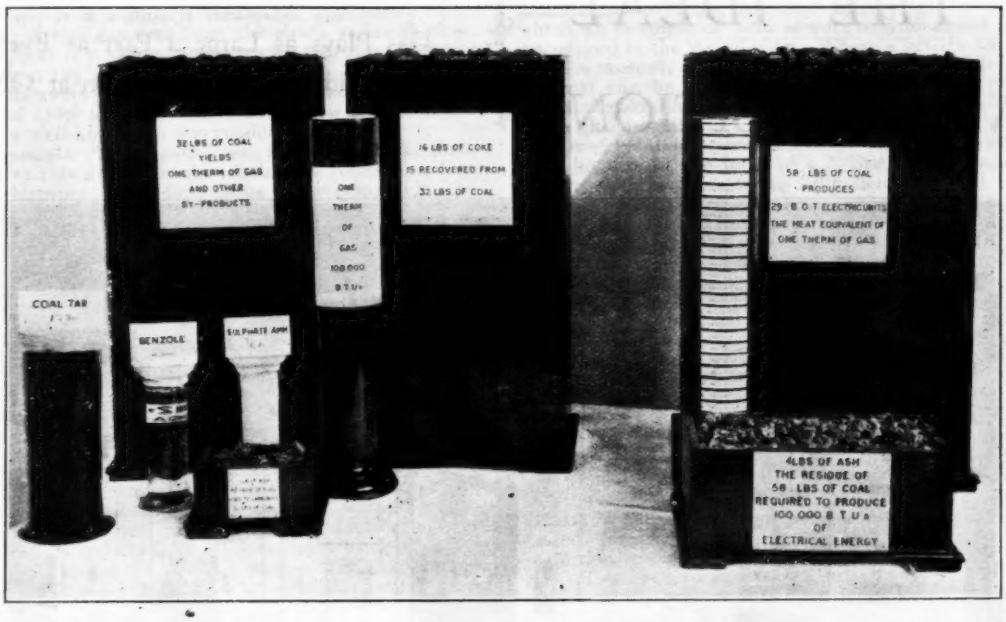
In the first section of his paper, Mr. Buchanan described the principle of the metal cutting operation, and explained that cutting by oxygen is essentially a chemical process in which the oxides of iron are formed and blown away before the iron reaches its melting-point, and the necessary temperature is chiefly maintained by the heat of the combustion itself. To make the process continuous it is necessary in practice to maintain an independent heating jet as well as the oxygen cutting jet. To start the process coal gas, or other suitable combustible, is used in conjunction with low-pressure oxygen for heating the starting point. When the temperature is sufficiently high the cutting oxygen is released and the chemical effect already mentioned is produced.

The disturbance of the metal due to the heat of the cutting flame probably penetrates about $\frac{1}{16}$ in., and tests have been carried out which show that this disturbance does not interfere with the strength of the plate.

Electric Welding, the second part of the Paper, was shown to be closely associated with the cutting of plates, and Mr. Buchanan pointed out that the ideal combination in the fabrication of steel structures is the oxy-cutting machine and the electric welding process. Structures so manufactured have light weight combined with great strength and reliability.

Examples of many welded products were shown by means of lantern slides and a film illustrating the method by which the molten metal in the arc welding process travels from the electrodes to the work was also shown.

A Visual Comparison of Gas and Electricity Practice


32 LBS OF COAL YIELDS ONE THERM OF GAS AND OTHER BY-PRODUCTS
ONE THERM OF GAS 100,000 B.T.U.
16 LBS OF COKE IS RECOVERED FROM 32 LBS OF COAL
58 LBS OF COAL PRODUCES 29 B.O.T. ELECTRICITY THE HEAT EQUIVALENT OF ONE THERM OF GAS
COAL TAR
BENZOLE
SULPHATE AMM
4 LBS OF ASH THE RESIDUE OF 58 LBS OF COAL REQUIRED TO PRODUCE 100,000 B.T.U.s OF ELECTRICAL ENERGY

It is proposed shortly to arrange for production of these models by a well-known firm in the Industry concerned with the manufacture of apparatus, thus making them available for general use. The original models, shown above, have been produced by the Wandsworth and District Gas Company, and have already been used on occasions of visits to works by members of various local organizations, to demonstrate the advantages of gas utility. As will be seen, they are primarily intended to convey generally a comparison between the two industries concerned in the supply of light and heat energy from a national and economic angle of view.

Nothing new is claimed so far as the models are concerned, but it is reasonable to suggest that from an illustrative point of view they convey to the average individual clearly and in an easily understood manner, as well as in a rather novel form, the national and personal advantages which accrue from modern gas-works practice.

The calculations have been based on a 70 therms per ton average per ton of coal carbonized in respect to the Gas Industry, and on an average of 2 lbs. of coal per B.O.T. unit of electrical energy. The models, therefore, demonstrate that when 32 lbs. of coal are carbonized of a quality ordinarily used for the production of coal gas, one therm of 100,000 B.Th.U. of energy is the result, with the added national economic advantage of providing 50% of the original weight of coal in the form of a solid smokeless fuel —coke. There are also in respect of liquid condensable products from the coal and gas $1\frac{3}{4}$ lbs. of crude coal tar, and 1/20 of a gallon of benzole. The ammonia recovery is represented by $\frac{1}{3}$ lb. in the form of sulphate of ammonia. These items represent only part of the gamut of products which are produceable, and do not, of course, offer any illustration of the multiplicity of products produced through the process of tar distillation.

The models illustrating the electrical industry show that on the same basis $58\frac{1}{2}$ lbs. of suitable coal are required to produce 100,000 B.Th.U. of energy, the equivalent of one therm of gas, and amounting to $29\frac{1}{4}$ B.O.T. units. There are no bye-products whatsoever except approximately 4 lbs. of furnace refuse, and it is hardly conceivable that this could be regarded as an asset in national economics.

Thus it will be noted that in respect of coal usage the ratio is 7 to 4, based on the therm as the unit. It clearly proves that the process of coal carbonization as practised by the Gas Industry is materially superior when the facts are realized, inasmuch as, although using a less quantity of coal per 100,000 B.Th.U., the production of essential bye-products as ancillaries to the main product still further weights the balance in favour of gas practice.

A Scientist on Tariffs.

"It is true that Great Britain flourished and became a great exporting nation under a Free Trade policy. It is equally true that she was nearly ruined under the same policy." These were the words of Mr. J. Davidson Pratt, O.B.E., F.I.C., who read a paper on "Tariffs and the Chemical Industry" before the Nottingham Section of the Society of Chemical Industry. "Free Trade was obviously not the real reason for the prosperity," he said. "This is a splendid example of the confusion of cause and effect. The real reason why this country flourished was because at that time we were the greatest manufacturers in the world and were producing goods that nobody else made. To-day we are no longer the only pebble on the beach. It is a calamity that Lancashire has not yet fully appreciated this obvious truth."

Earlier in his address, after describing revenue and protective tariffs and the various types of duty, Mr. Davidson Pratt gave a historical survey of the country's post-war tariff policy as it affected the chemical industry. The great advantages that had accrued not only to the fine chemical and dyestuffs industries, but also to the users of these products as a result of the Key Industry Duty under the Safeguarding of Industries Act, 1921, and the Dyestuffs (Import Regulation) Act, 1920, were clearly set forth. The value of a strong and progressive organic chemical industry was now well recognized as of vital importance to the national prosperity and safety, and the experience which it afforded to chemical technologists of all kinds was of the greatest value in the development of industries outside the purely chemical field.

The Hydrocarbon Oil or Petrol Duty, which, in effect, had given a bonus of 8d. per gallon to home-produced motor fuel, had stimulated the production of benzole from coke ovens and gas-works, but had adversely affected those sections of the chemical industry which used benzole and toluole as essential raw materials. It had borne heavily on the dyemakers who have to meet the foreign price with their dyes and intermediates. The recent duty on heavy fuel oil had stimulated the use of creosote and benefited the coal industry in several ways.

Mr. Davidson Pratt went on to explain the procedure and provisions of the Import Duties Act. He also dealt with arguments necessary to carry an application for free listing, or for an additional duty, to a successful conclusion. These were set forth in a way that should assist any industry which has cases under consideration.

The chemical industry, he continued, had been successful in securing free entry for practically all its important raw materials which were not commercially available within the Empire, and had been able to protect itself against foreign competition by additional duties. The success of the industry in the field of tariffs was attributable to its live and let live attitude and to the willingness of manufacturers to give adequate guarantees to consumers that additional duties would not be exploited to their disadvantage.

Special commendation was given to the impartial, broad-minded, and far-sighted attitude of the Import Duties Advisory Committee in adjudicating on tariff problems. Its freedom from all political interference was welcomed.

AT THE IDEAL HOME EXHIBITION

Gas Plays as Large a Part as Ever at this World-Famous Exhibition at Olympia

Like an afterglow of Easter—where holiday lingers graciously and there is consolation for every regret that comes from Easter Monday's passing—the *Daily Mail* Ideal Home Exhibition opened at Olympia on April 3. Mr. and Mrs. Cecil Harmsworth performed the official ceremony which threw open the whole twelve acres of Olympian inspiration and entertainment to all. The Exhibition continues until April 28, and is open daily from 10 a.m. to 10 p.m.

After the British Industries Fair the Ideal Home Exhibition stages probably the most comprehensive display on behalf of the Gas Industry in this country, and the service which gas can and does render in the modern "ideal home" is most ably demonstrated not only by the London Gas Exhibit, but also by many well-known firms in the Industry.

The London Gas Exhibit.

Four large London Gas Companies are represented by the London Gas Exhibit Committee, who have combined to show the public the many labour-saving possibilities of gas in the home. The undertakings co-operating in this very effective display comprise: The Gas Light and Coke Company, the Croydon Gas Company, the Tottenham and District Gas Company, and the Wandsworth and District Gas Company.

Examples of all the latest labour-saving gas and coke appliances for the modern home are to be seen on the stand of the London Gas Exhibit, which is tastefully set out in a general colour scheme of primrose and green and attractively lighted by concealed units above opaque glass panels in the ceiling and by individual up-to-date pendant fittings, all being, of course, switch-controlled. This fact is freely advertised by notices displayed on the walls, and the public are invited to try the switch control for themselves to prove that gas lighting can be operated just as easily as electricity, with the added advantage, in certain cases, of it being possible to turn the light down as well as out.

In the centre of the interior of the stand is the "gadget table" recently introduced by the Gas Light and Coke Company in their showrooms, and referred to previously in these columns. This takes the form of a large "table" bound in polished steel and supported on an illuminated base, on which are displayed all the various little domestic gas fittings which lend themselves to plugging in to any handy gas point, such plug sockets being arranged around the edges of the table. Among the small portable appliances shown are gas pokers, waffle makers, self-contained kettle, iron, bowl heater, curling iron heater, dish-warmer, small portable heaters, and gas table lamps.

At the farther end of the stand, facing the main entrance, is a modern kitchen "setting" on a platform for demonstration purposes. This comprises a high-grade enamel gas cooker in the centre, sink and small gas water heater in combination with a modern kitchen cabinet, a gas operated refrigerator, a drying cabinet, and a handy hot-closet for warming dishes. The hot-closet has been specially designed for use with plate rack pillars for fixing to gas cookers in place of the usual plate rack, or it may, alternatively, be fixed direct on to a wall. The hot-closet will accommodate 13 10-in. plates on edge, and these will be sufficiently warmed in half an hour. It is finished in white enamel, the interior being mottled.

An attractive range of radiators and coloured cookers of many designs are displayed, while there are also on the stand facilities for demonstrating wash-boilers and ironing—in fact, the London Gas Exhibit gives an idea of all the various ways gas can help in the running of the home. Coloured enamel cookers are shown in seven different finishes; there are gas water heaters of several types to give instantaneous hot water at a turn of the tap, while a modern touch is given by various treatments of the built-in panel gas fire a foot or so above floor level, thus dispensing with the need for a hearth. A copious supply of interesting literature featuring the activities of "Mr. Therm" is available, while an artist makes lightning sketches beside the main entrance with a view to catching the public's eye.

An Ultra-Modern Display.

A number of other firms well known in the Gas Industry have comprehensive displays in the Heating and Lighting Section.

However ultra-modern the scheme of the Ideal Home Exhibition, in each successive year the Radiation stand seems to fit into place easily and naturally. This year is no exception. "Staybrite City" could contain no more up-to-date vehicle of labour-saving and artistic delight than the latest "New World" Regulo-controlled cooker. The display of these cookers and ranges in various beautiful colour finishes, combined with bright chromium-plated fittings, is attracting universal admiration from visitors, and the ease with which even whole dinners can be cooked without attention is demonstrated twice each day on the stand. Considerable interest is always taken in the "gas match" attachment to these cookers, which is generally acknow-

ledged to be an economy device of the first importance, apart from its convenience.

The very latest production in gas fires provides the chief interest in the stand, and this is the new " High Beam " gas fire, which is a standard Radiation appliance. The chief feature of this gas fire, from the public point of view, is the claim that it provides an increased heating efficiency of no less than 12½%. This is equivalent to the saving of one therm in every eight used—no mean achievement in these days of keen economy. The many new points in the fire itself are well-known to our readers.

The ever-popular " Sunbeam " gas fire is also to be seen, the feature of this fire, of course, being its resemblance to a brightly-burning coal fire, thus preserving all the æsthetic appeal associated in some minds with the latter, but without any of its drawbacks. Another fire certain to attract attention is the " Sunsquare " which is a development of the first " panel " type of fire originally introduced by Radiation Limited some years ago.

The thermal storage water heaters made by the Radiation firms have in the last year or two made very rapid progress in popular use. Large water heaters capable of taking care of the whole requirements of the household are seen in actual working conditions, and also the smaller models that are useful for supplies of hot water to sink, lavatory basin, &c. In each case the working is entirely automatic, and so far as exterior finish is concerned, these water heaters together are an object lesson in what can be done to brighten the modern kitchen and bathroom.

Altogether, the exhibit of Radiation Limited this year is a striking tribute to the progressive minds directing the production of gas appliances, and demonstrates clearly that although gas is old in the public service, its outlook is full of youthfulness and assurance of continued advancement.

R. & A. Main's Exhibit.

A pleasing note of colour is struck by the display of Messrs. R. & A. Main, Ltd., the attractive finishes of the firm's gas fires arranged round the stand contributing in no small measure to this effect. Now that colour is so much in evidence in the furnishing of the modern home, the selection of beautiful finishes obtainable on Main gas fires enables the fireplace to be included in perfect harmony with any decorative scheme.

The back of this stand takes the form of a small model kitchen complete with gas apparatus for cooking and water heating, while demonstrations are given on the stand by Miss Gompertz and Miss Gillham, who are well-known cookery experts, on a " Maintop " de Luxe cooker. The firm's new " Wessex " cooker in enamel finish and embodying automatic oven control is shown, as also examples of the " Mainscreen " portable fire. On the water heating side, in addition to the well-known " Domain " heater for situations where space is limited, Messrs. R. & A. Main are showing a new instantaneous heater known as the " Junior " geyser. This apparatus is soundly constructed on well-tried principles and is attractively finished in porcelain enamel. It is made on the sealed principle, so that the hot water may be utilized for any purpose; all the waterways are heavily tinned, and interlocking gas and waterways are provided so that the geyser is absolutely foolproof.

The inner chamber is removable, while the top, body, and base are separate units, and can therefore be adapted to any position. The copper body is encased in an electrically-welded steel shell, which is porcelain enamelled. The band, base, and fittings are finished either in chromium plate or in oxidized bronze, a china-white bracket being included. The whole effect is pleasing, and the finish is both labour-saving and durable.

Thomas Potterton (Heating Engineers), Ltd.

A glance at the display of Messrs. Thomas Potterton (Heating Engineers), Ltd., readily shows the developments of recent years in the matter of appearance as well as general utility of gas-heated apparatus.

The whole of the exhibits on this stand are treated in a manner to conform with modern requirements of cleanliness, and display a series of outfits in the hot water and heating field disposed to almost every need in residential and business life. On the domestic side an " Emperor " set in ivory-white enamel is shown in action, delivering hot water for culinary purposes, and having a chromium-plated towel dryer in circuit. For larger demands in the hot water supply field single and twin unit " Empire " insulated and enamelled lagged storage sets are on view, the former being shown with a coke boiler attachment finished also in vitreous-enamel, an arrangement that is often in demand in houses of moderate size where the servants need the warmth of a coke fire for winter comfort. " Emperor " and " Empire " units in various finishes, also the " Emperor " thermal storage sets in one of the larger capacities, are exhibited.

Having regard to the increased demand for gas-fired central heating apparatus, a special feature occurs in the display of the " Rex " series of gas-fired heaters in various sizes, one unit working a complete installation of four " Ideal Neo-Classic " radiators. The boiler has standard mountings, including bi-metal thermostat, in addition to which an example of both remote and localized controls is introduced in the installation. Where a satisfactory " key " room is present, single-point remote control with its moderate cost can be readily recommended, but in other cases the higher outlay entailed in the fixing of " Magnetic " valve thermostats is soon recovered by the economy and improved results obtained thereby. An example of sectional coke heaters in the form of a " Britannia " boiler is also shown, such systems being fully demonstrated by leaflets and photographic illustrations.

A special feature of the stand is the interior lighting, which, with the assistance of the Gas Light and Coke Company, has served to demonstrate the soft and pleasing effect of modern methods of gas illumination.

A Coke Display.

The exhibit of the London and Counties Coke Association is devoted to appliances for the use of smokeless gas coke, and as proof of its " smokelessness " one of the demonstration fires is fitted with a glass flue. The adaptation of the open grate to the use of smokeless gas coke is shown in various settings, demonstrating its cheerful and efficient character. Various designs of modern open fireplaces using gas coke, combined, of course, with gas ignition, are to be seen in operation, while coke-fired domestic hot water boilers are demonstrated, as also automatically-controlled boilers for central heating systems. The last-named installation shows how admirably a coke-fired system can be controlled by means of room and water thermostats. rendering the central heating independent of human control once the fuel is supplied to the boiler.

Messrs. Ewart & Son, Ltd., have a number of attractive water heaters on their stand, including the " Califont " de Luxe with porcelain enamel casing. The firm's multi-point water heaters are designed to supply hot water to bath, basin, and sink, and other hot water taps throughout the house, while a new type " Vivo " heater provides a satisfactory hot water service at low cost to the kitchen sink and bath, &c. Examples of these appliances are shown in coloured porcelain enamel finishes with chromium-plated fittings.

The central heating load is ably catered for by many appliances to be seen on the stand of the National Radiator Company, Ltd., including " Ideal " domestic boilers, the " Rayrad " flat-surfaced radiant radiator, and a wide range of central heating radiators in various sizes and many attractive colours. Also displayed is the firm's well-known " Cookanheat " for cooking, hot water supply, and radiator heating, together with the " Ideal Neofire " which combines the advantages of an open fire, warmth for two or three small radiators, and hot water supply. Towel rails in chromium and nickel plated finishes are also included.

Geysers and storage heaters in a variety of pleasing shades are to be seen among the exhibits of Messrs. New Geysers, Ltd., including their " Instor " combined apparatus for domestic hot water supply. Multi-point heaters are also in evidence on this stand.

Messrs. R. Russell & Sons, Ltd., demonstrate their well-known " New Herald " gas combination, which consists of an efficient gas oven, thermostatically controlled, hotplate with griller and boiling burners, a gas fire for providing warmth for the kitchen, and a patented circulating boiler automatically regulated for working a 30-gallon storage tank, supplying hot water for all domestic purposes. All gas heated and combined in one compact unit, this appliance is of pleasing design and assures complete absence of smoke, soot, ashes, dust, flue-cleaning, and fuel storage.

Glass-Panelled Oven Doors.

Examples of gas cookers with glass-panelled oven doors are to be seen on the stand of the Vulcan Stove Company, Ltd. To the many selling points of the firm's " Equi-Heat " cookers are, of course, now added the attractions of the " Armourplate " fireproof glass-panelled oven door and the inclusion of a set of the well-known " Orlak " fireproof glass oven utensils, which should make an immediate appeal to the housewife. The glass door has been carefully designed so as to eliminate the objection, on the score of loss of transparency, of the glass becoming steamed over. The glass panels are practically unbreakable and are completely heat-proof, and the construction maintains complete insulation of the oven.

The hotplate of the " Equi-Heat " cooker has also been well planned so as to give the greatest ease in cleaning. All burners are easily removed for cleaning and cannot be wrongly positioned on replacement. The burners are carried on patented self setting and centering mountings. Another feature of this cooker is that the taprail is carried

in the moulding of the cornice and is completely protected thereby. It offers a clear flat surface which facilitates cleaning. The " Equi-Heat " cooker is also made with an ordinary white porcelain enamelled steel door, but apart from this it is similarly constructed throughout. Automatic oven heat control is, of course, a standard fitting on these models.

A good deal is being seen and heard at the present time of the " Portcullis " gas fire, and a full range of all the different styles of this attractive and efficient appliance is to be seen on the stand of Messrs. Bratt, Colbran, & Co. and the Heaped Fire Company, Ltd. New designs of wider application have been added to the range of fires, which are shown in colourful settings of marble and tiles in keeping with modern architectural requirements. A new departure is the " Portcullis " convector heater, which may be conveniently plugged in to a gas supply wherever wanted. In design this heater is simple and well-suited to the modern style of furnishing, being finished in " Lustral " colours and bronze. The gas supply is governed to a low pressure, the consumption being regulated to only 12 c.ft. per hour. Various portable screen fires are also to be seen on this stand.

A Novel Cooker.

The most outstanding feature of the display of Messrs. Sidney Flavel & Co., Ltd., is their " Kabineat " gas cooker. This is a very interesting appliance embodying so many novel points that it must make a wide appeal to the housewife. When closed, the " Kabineat " has the appearance of a modern utility room furnishing, the exterior being finished in stainless steel and " Foochow " heat resisting synthetic enamel in a variety of six colours to provide a choice to harmonize with any kitchen decoration scheme. So far as the cooker proper is concerned, this embodies a hotplate with large and extra fast double grill, the burners of which are made semi-rotating, so that the grill can also be used as a powerful double burner for large utensils. There is also an efficient boiling ring and a simmering burner. An enamel grill pan with tinned grid and white enamelled crown plate are also provided. The oven, fitted with a safety locking tap, is exceptionally deep from back to front, and the whole of the 17-in. height in the door space is available for cooking. An unbreakable glass panelled oven door is provided, while the Flavel-Sugg automatic oven heat control is designed so that one bold white letter is visible to indicate the desired setting. The oven has three grids, a Yorkshire baking tray, and a drip pan, while a " Metro " pilot lighter for the hotplate and oven is another point of convenience.

It is, however, some of the accessories attached to the " Kabineat " which are of particular interest to those who are familiar with the more orthodox design of cooker. The cover of the appliance lifts up, while the plate rack frame can be raised, automatically locking the cover, so that when the plate rack itself is swung into position, the whole structure is rigid and perfectly safe for the support of dishes and other cooking utensils. The composite pastry board, having the appearance of highly polished Silican marble, is now ready for use. When not required and while the hotplate is being used, this board is placed in the back of the cover as a splash back. Two polished steel extension plates may also be fitted on either side of the hotplate to give extra working space, and a further feature of these plates is the incorporation of a towel rail at their extremities for dish cloths. The twin doors of the " Kabineat " open to reveal a complete range of useful accessories mounted on detachable aluminium racks complete with drip troughs. These include steel knife, wooden spoon, egg slide, basting spoon, whisk, combined spoon and fork. Two removable pockets are also provided, one containing an asbestos oven cloth, and the other a double-handed oven cloth. The makers supply this cooker complete with a set of six " Pyrex " oven ware, two casseroles, a soufflé dish, and a refrigerator dish with lid.

Also shown on Flavel's stand are examples of radiators of the panel type, including a safety model for garages and a new built-in model, flush with the wall. The " Lumetro " fire is to be seen, together with various panel fires, and, of course, the firm's imitation log fire operated by gas.

A Demonstration of Glass Blowing.

A most interesting demonstration of the ancient craft of glass blowing on the stand of Messrs. James Powell & Sons (Whitefriars), Ltd., in the Arts and Crafts Section, has been rendered practicable through the co-operation of the South Metropolitan Gas Company, who have installed the glass melting furnace. This furnace, which was designed by the Company's Industrial Department, is of the twin pot high-duty type fired with low-pressure gas, and the remarkable feature is the very high temperature which can be attained with low-pressure gas—in excess of 1,400° C. So exceptionally efficient is the insulation of the furnace that, in spite of this high interior temperature, the exterior walls are comparatively cool, the loss by radiation being extremely small. Each pot holds 80 lbs. of glass, and is charged overnight; the " metal," as the molten glass is termed, is ready for blowing at 10 a.m. in the morning. Messrs. Powell & Sons have, we understand, expressed not only surprise at the high temperature attainable with this low-pressure gas furnace, but also complete satisfaction with the work it is doing.

Gas in the Model Home.

The use of gas at the Ideal Home Exhibition is not confined to the Heating and Lighting Section, for the *Woman's Journal* house is fully equipped with up-to-date gas apparatus for central heating and hot water purposes, in addition to gas fires in individual rooms. The central heating installation in this house consists of a gas boiler in grey mottled enamel finish, automatically-controlled, while the hot water requirements are provided by a gas multi-point heater. In the kitchen are sink water heater, double oven gas cooker, gas-operated refrigerator, and gas clothes washer, an interesting feature of which is its double-geared wringer.

A gas cooker and clinical lamp are demonstrated in a model nursery, while a cooker is also in evidence in one of the model kitchens.

Altogether the Gas Industry is most ably represented at the Ideal Homes Exhibition, and the London Gas Exhibit Committee and the various appliance manufacturing firms are to be congratulated on a very forceful piece of co-operative propaganda on behalf of the Industry at probably the most popular of the country's annual exhibitions.

Legal Intelligence.

Liability for an Explosion.

County Court Action at Plymouth.

An important point regarding the liability of the Gas Company in regard to an explosion which was stated to have wrecked a confectioner's shop arose in the course of a County Court action which lasted over four hours at Plymouth on Friday, April 6, in which his Honour Judge Lias reserved judgment until the next court.

The plaintiff, Miss Mabel Helma Atwill, of 5, Brunswick Place, Plymouth, being only nineteen years of age, sued through her mother, and the defendants were the Plymouth and Stonehouse Gas Light and Coke Company, from whom £50 damages was claimed for loss of trade, damage to stock, and personal injury arising out of an explosion at the shop, situated at 10, The Parade, The Barbican, Plymouth.

Plaintiff's story was that on the morning the explosion occurred she went to the shop and found two customers waiting. When she opened the door there was a strong smell of gas, and both doors were accordingly opened. When they thought the place was cleared, and it appeared safe, a light was put to the gas ring, but nothing happened, and a few minutes later she turned the gas off. About ten minutes afterwards she went to re-light the ring to put on a kettle, and an explosion occurred. She was blown back, the counter was moved, and the stock considerably damaged.

The owner of the property, Mr. Russell Pearn, said that business was stopped for a month. He considered that there was a leak where the gas main was connected to the supply pipe to the house, and that the gas escaped into the shop via the tunnel formed for the pipe.

When Mr. Alfred Robins Langford, the Gas Company's Distribution Superintendent, went into the witness box he was closely questioned by the Judge. Mr. Langford said the gas main was 2 ft. 6 in. below the surface of the ground and was covered by granite setts of 4 in. thickness, 6 in. of concrete, and shale. The main was of cast iron. He considered that the life of such a pipe was about sixty years, and that that particular pipe was laid about thirty years ago, and was properly laid. He found a very fine fracture 3 or 4 in. long on the top side of the pipe, quite clear of the supply pipe to the shop. In his opinion the fracture had been caused by frost.

Mr. Mayburne Pearce, for the defendants, said that if his Honour held that it was negligence with pipes laid at 2 ft. 6 in. the Company would have to take up 182 miles of pipes in Plymouth and district.

His Honour reserved judgment until the next court.

Australian Gas Light Company.

The net profits of this Company for the past half-year in accordance with the Auditors' certificate of profits, including the balance brought forward, amount to £210,375. The Directors recommend the payment of a dividend for the six months of 3% on the " A " and " B " shares, which will absorb £123,300, leaving a balance to be carried forward of £87,075.

PLANT SAFEGUARDS

By H. C. Widlake, Assoc.M.Inst.Gas E., A.M.I.E.E., A.M.I.Mech.E., of the Plymouth and Stonehouse Gas Light and Coke Company.

(*Concluded from p. 34.*)

It is pointed out that the natural furnishings of a retort house render it very difficult to secure uniform good lighting, and it is useless to install a stopping system if time is going to be lost while an excited operator is searching for an emergency switch.

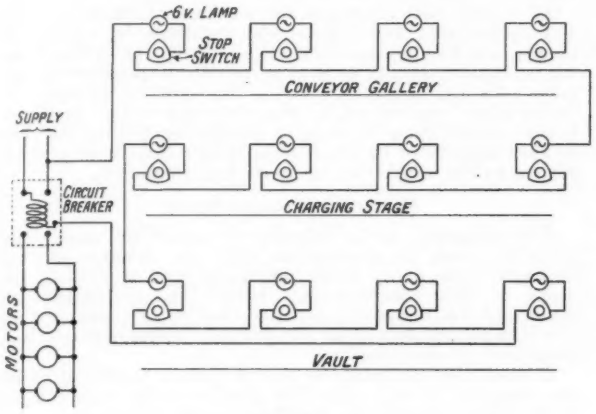


Fig. 2.

Stopping Cords.—Where structural details permit of the running of a straight line between distant points "stopping cords" can be used for the purpose of providing an infinite number of stopping stations between those points. This system is shown in fig. 3, where three cords *a*—*a*, *b*—*b*, *c*—*c*, are shown running over the three stages of what may be a vertical retort house.

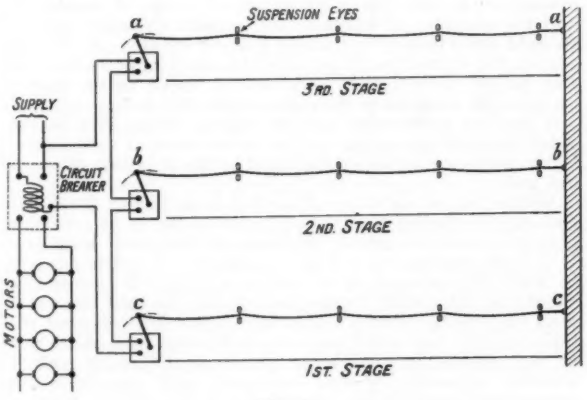


Fig. 3.

On the right-hand side of the figure each cord is anchored, and, running through large bore eyelets, passes over the different stages to the other end of the house where the ends are made fast to the operating levers of normally closed ironclad switches.

A pull on any portion of a cord causes the switch to open circuit. The switches are wired in series with the operating coil of a no volt circuit breaker, and the opening of any switch brings about the fall of that breaker and the consequent stoppage of as many motors as are supplied through the breaker.

It is true that the operating coil is re-energized as soon as the cord is released, but the breaker is incapable of re-setting itself, and has to be closed by hand.

This system, so far as the cords are concerned, is similar to the emergency chains as used on railway coaches but, needless to say, it is not necessary to impose a penalty for improper use. The cords are run with an easy loop between the eyelets supporting the line, so that the tension of each cord is insufficient to open the switch to which it is connected.

Before leaving the subject of elevators and conveyors reference should be made to the need for some measure to ensure against the starting of the plant while greasers or repair men are working on it. It is all very well to say "such an accident should have been impossible," but human nature being what it is these things can, and do, happen. It is characteristic of this class of machinery that the man starting it up has only a very restricted view (sometimes he has no view at all) of the running gear and he has to take it for granted that no employees are in dangerous proximity to the machinery which he is about to put into motion. Enamelled iron plates should be available for hanging over the control gear of plants on which work is about to be carried out. These plates should have a white ground with bold red lettering—"DANGER—MEN WORKING ON PLANT," and it should be the duty of the foreman in charge of the plant to see that no work, however minor, is started until the plate is in position.

A further precaution, used on plants under the writer's care, consists of a loud sounding bell, so sited that its warning note can be heard at every part of the plant with which it is associated. Before starting up it is the duty of the attendant to give a prolonged ring which warns any men in the proximity of the machinery that it is about to be set into motion.

Telpher Safeguards.

Telpher machines, by their very nature, demand the use of certain definite safeguards. There are two things to be guarded against—*i.e.*, the overhoisting of the load until it comes into collision with the frame of the machine, and the danger of the driver setting the machine in travel motion before he has taken his seat in the cab. The author does not wish to resurrect unhappy memories and asks his readers to believe that this latter procedure does not lie beyond the limits of human imbecility.

Overwind switches can be fitted over the main hoist in such a manner that lifting power is automatically cut off before the load can rise into the danger zone. In the absence of this precaution there is always a danger of hoisting the load too far into the machine, particularly when operating over bunkers where the clearance is small.

Gate switches, working in conjunction with hinged or sliding gates, make it impossible for a man to leave a machine without interrupting the current on the supply side of the control gear. Also a properly designed gate switch renders it impossible for an operator to switch on the current until he has definitely entered the cab, and closed the gate behind him.

A further valuable safety device for telpher working takes the form of signalling lights which, at night, inform an oncoming driver as to the position of the track switches which he is approaching. On branch tracks it is customary to fit section insulators some distance before the switch or points, so that if the route is not clear for the passage of the machine, it runs into a dead section and is brought to an automatic stop by the action of its automatic travel brakes.

If these brakes are in poor adjustment, if the machine is run into the dead section at too high a speed, with resultant skidding, or if the rail is greasy, there is a danger of the machine coasting or skidding into trouble in spite of the apparent protection afforded by the dead section.

A protective device takes the form of a high box of square section, divided into two horizontal portions, and so set that one side can be seen from either branch track. The vertical sides are fitted with red and green glasses one over the other, the colours being staggered in relation to the two sides. Each compartment is fitted with a lamp fed from that portion of the branch wiring which becomes dead when the track switch is closed against that particular branch. Thus, the lighted lamp will always give a green light in the direction of one branch and a red light in the direction of the other.

If a branch track is switched on to the main line the approaching driver finds a green light facing him but if the track is closed against him he is faced with a red light at a slightly different level. This red light meets his eye long before he reaches the section insulator so that he has ample

time to bring the machine to a standstill with his foot brake, and does not need to run into the dead section before finding out, by the automatic braking system, that the track switch is closed against him.

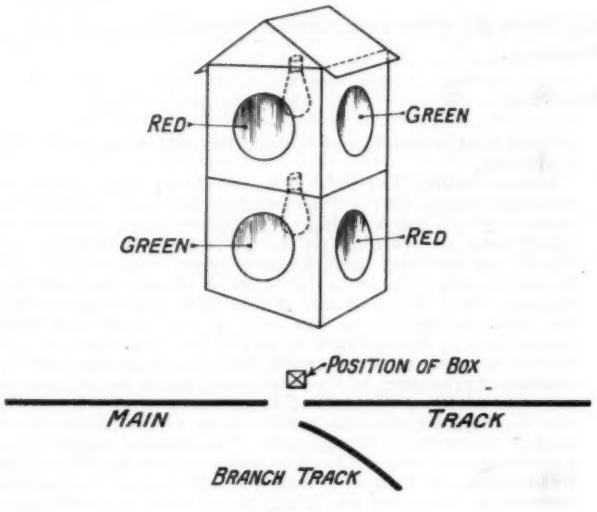


Fig. 4.

A sketch of the box used is shown in fig. 4, in which the staggered glazing is clearly indicated. It is very simply made, costs very little to install, and is a valuable accessory to the working of a telpherage.

The hoisting ropes used on coke telphers should be frequently and regularly examined for signs of wear or failure, particularly at that point where the ropes are attached to the skip bales.

Stoking Machines.

In much the same way as limit switches are fitted to telphers for the purpose of ensuring against the load being hoisted too far into the machine, so it is necessary to fit limit switches to stoking machines to control the limits of the charging or pushing mechanism. If these elements are driven too far through the retort, or alternatively are drawn back too far into the machine, considerable damage can be caused to the gear.

Tappet switches are used for this duty and are so arranged as to cause the interruption of the current when the mechanism has reached the limits of its normal travel.

A further very necessary safety provision on horizontal stoking machines takes the form of a fitment for the purpose of ensuring that the travelling motion cannot be set in operation until the stoking element has been drawn clear of the machine. In the absence of such a device serious damage can be caused to both the machine and the settings. The type used on the machine under the author's care (Fiddes Aldridge) takes the form of a rotary contact fitted to the main chain wheel shaft and making contact in the travel circuit only when the chain is back, in its normal home position, in the machine.

Electric Lifts.

Electric lifts built by firms of good repute are generally fitted with adequate safety gear, but the local conditions under which they are used sometimes indicate the advisability of supplementing or modifying the standard arrangements.

The author has a vivid recollection of travelling in a lift when the control gear failed and the cage shot past the second stage although the "Up" button in the cage had been released. The other occupants of the cage did not appreciate the definite stopping properties of the service and final top limits, and were in a rather unhappy frame of mind before, the ascent being over, the cage was brought to an automatic standstill. Following on this experience a "stop" switch controlling both poles of the supply was fitted at the top of the shaft with an operating cord hanging vertically through the cage, and tensioned with a weight at the bottom of the shaft. A notice was prominently displayed in the cab—"TO STOP LIFT IN CASE OF NEED PULL THIS CORD."

The average passenger does not appreciate the certainty of the top limits, and there is a risk of a panic-stricken man attempting to leave the moving cage by snatching open a passing stage gate.

The position of the controller should be determined with a due regard to the nature of the building in which the lift is installed. The conventional site for this gear is beside the driving unit at the top of the shaft. In the case of a vertical retort house lift it has to be remembered that the shaft head is the natural lodgment for obnoxious fumes and gases. Control gear in this position is usually approached by a ladder leading up from the last stage, and after an electrician has attended to a control gear fault he is often in an unfit state to make the descent.

As at least 95% of lift faults occur in the controller there is a strong argument for housing this unit of plant at the foot of the shaft, where the air is fairly pure, where access is easy, and where faults can be located and remedied much more quickly than if a man has to make his way by devious routes to the head of an 80 ft. high shaft.

Stage gate switches are prone to fault in such a manner as to permit of the lift being worked with the gate open. Such jobs should be attended to immediately, and pending their completion the particular gate should be padlocked and that stage kept out of commission.

All details, both electrical and mechanical, should be subject to frequent and regular examinations by competent people, and the foreman in charge of the plant in which the lift is installed should be held personally responsible for the proper loading of the cage within the limits of its capacity. When plant repairs are in progress, and heavy parts are being handled there is always a temptation to load the cage to the capacity of its floor area, rather than with a strict regard to the weights of the parts being handled.

Steam Condensing Plant.

The economies to be effected by installing condensing plant to work in conjunction with the dynamo engines depends upon many local conditions and is outside the scope of this contribution. Where the conditions are favourable to condensing practice the ejector condenser has much to recommend it on the grounds of low first cost and simplicity of construction.

Topographical conditions do not always permit of siting the condenser in such a position relative to the main engines as to ensure against the possibility of reflex action (water being drawn up from the hot well or through the condenser nozzles into the low pressure cylinders), and the need arises for the use of what may be termed artificial safeguards.

A free working non-return flap valve should be fitted on the steam inlet to the condenser, and the main between this point and the engines should be given a definite rise, so as to provide a section which can freely and safely flood, and so induce the certain action of the flap valve.

A secondary precaution takes the form of a vacuum breaker installed between the engines and the condenser steam inlet. The water head on the condenser is communicated to this fitting by means of a pipe of ample size, and the pressure of water in the breaker cylinder operates to hold up a heavy vertically guided weight. If for any reason the normal working head becomes appreciably less, this weight is released, and, an air valve being thereby opened, the vacuum in the exhaust main is destroyed.

A further precaution against reflex action can be provided by drilling a ring of ¾-in. holes around the snout of the condenser just above the level of the overflow sill in the hot well.

Where the condenser is installed at a higher level than the engine exhaust branches it is necessary to fit a vacuum trap to ensure the proper drainage of the lower level pipe. It is good practice to install a container of ample capacity between the exhaust main and this trap. This container should be fitted with gauge glass fittings so that the engine man can see the amount of water in it. In the event of a failure of the vacuum trap there will be no immediate need to shut down the condensing plant, as the ample and observable capacity of the container will permit of the necessary repairs being carried out to the trap. Further, by closing the valve between the main and the container and opening a pet cock the contents of the container can be drained off from time to time, until the trap can be again brought into commission.

The economy due to condensing with sets rated on low steam pressures is considerable, and this simple provision will be found to pay for itself the first time the vacuum trap sees fit to "jib."

Relief Holders.

Relief holders used in connection with water gas manufacture should be protected against the danger of being worked beyond their safe vertical limits. Even if the holder is clearly within the view of both exhauster men and plant operators, this advantage does not count for very much on a foggy night.

A holder height indicator should be fitted in the water gas engine room and supplemented by a siren to give an audible warning when the lifts are approaching the danger zone on either their up or down travel. In the case of a

holder adjacent to the engine room a mechanical indicator is to be preferred, but where the holder is remotely situated the information must be transmitted by electrical means. In this case the contacts operating the siren should be housed in the transmitter box at the foot of the holder.

A very useful fitment on such a holder is a distinctive light, a " daylight " electric lamp, for instance, carried on a short standard bolted to the edge of the top lift and supplied from the works power system via a hanging loop of C.T.S. cable. Such a lamp can be identified from many positions on the works and will give a clear indication as to the position of a vitally important unit of plant.

Lifting Tackle.

On a large undertaking the proper care of lifting tackle is somewhat of a problem. Cheap tackle is dear at any price, and it is taken for granted that this gear is bought from firms of repute.

So far as fitting shop tackle is concerned this does not give much trouble, and the fitters generally regard it as they regard their own tools, and zealously bring it into the shops after each job.

Apart from the duties of the fitting shop staffs, however, repair works of some sort is nearly always in progress over a wide area, and unless the different gangs are very well supervised there is always the risk of tackle being thrown aside when finished with, or, at the best, dumped in some convenient store where it lies un-noticed and neglected until required for another job.

It is desirable that one man, preferably a rigger, be made responsible for this wandering tackle, his duty being to see that it is returned to some central store after each job, cleaned, examined, and suitably stored.

Blocks should be hung from suitable roof fittings where they can be properly examined and quickly selected when again required. A list should be kept of their age and work done, and they should be returned to the makers at suitable intervals for overhaul and testing.

So far as possible sling chains should be replaced by wire rope slings, which are more reliable, and lend themselves far better to examination for flaws.

It often happens that, in order to facilitate the operations of contracting firms, tackle from the works stocks is loaned to their erectors.

While this practice is not desirable, it is difficult to stop it, as so many contracting firms have curious ideas as to what is required for the proper erection of their plants.

If such loaned tackle failed, causing personal injury to the contractors' servants, the position, in law, of the owners of the tackle might be rather embarrassing. It is accordingly desirable that a clause should be inserted in erection contracts to the effect that the contractor shall hold himself responsible for the results attending the failure of any tackle which may be loaned to him or to his accredited representative.

Such a clause may very well discourage the practice of borrowing tackle and induce contracting firms to send along proper and sufficient gear for the erection of their plants.

In the matter of safety measures it is very desirable that regular opportunities should be afforded whereby all measures affecting the personal safety of workers and plant operatives can be freely discussed between the people responsible for the various sections of the works.

This can be best secured by the setting up of a Safety Committee composed of the chief officials and the senior foremen or charge hands. Such a Committee could meet once a month for the purpose of receiving and discussing accident reports, suggestions, and, in short, all matters bearing upon the administration of safety measures.

At such meetings there is ample opportunity for the free expression of individual views, and debatable points can be settled in a far more satisfactory manner than can be achieved by casual discussion between the various people concerned.

It may be observed that the Home Office regard such Committees with a considerable degree of favour and view their existence as a proof of a sincere desire on the part of the management to meet statutory requirements.

The author desires to express his thanks to Mr. R. J. H. Clark, Chief Engineer to the Plymouth and Stonehouse Gas Light and Coke Company, for the courteous permission which enables him to publish these particulars of safety measures in use on the works of that Company.

North British Association of Gas Managers

SPRING MEETING AT PERTH

The Spring Meeting of the North British Association of Gas Managers was held in Perth on April 6. The President, Mr. Lewis Bain, of Cullen and Banff, was in the chair and was accompanied on the platform by Lord Provost Thomas Hunter, Perth; Ex-Baillie Gowan, Convener of the Perth Gas Committee; the Town Clerk of Perth, Mr. R. Adam; the Senior Vice-President, Mr. G. Bruce, St. Andrew's; the Junior Vice-President, Mr. J. Dickson, Kirkintilloch; and Messrs. A. Cuthbert (Grangemouth), D. Fulton (Helensburgh), T. W. Harper (Ayr), A. S. Nisbet (Paisley), R. J. Philp (North Berwick), D. Vass (Perth), A. Walker (Kilbarchan), and the Hon. Secretary and Treasurer, Mr. A. Kellock (Airdrie), and Mr. J. Bridge (Elland), Hon. Secretary of the Manchester and District Association.

The President having expressed his gratification with the excellent attendance,

Lord Provost Hunter said that it gave him peculiar pleasure to attend the meeting and see so many old friends. It had been under the auspices of gas that he had been launched into the stormy sea of municipal politics. He had been a severe critic of gas, and for this reason had been appointed Convener of the Gas Committee. He had held this office for six years and had made many friends in the Gas Industry. He had joined hands with Mr. Vass, the present Gas Manager, and together they had brought the Perth Gas-Works up-to-date. Since then the Gas Department had gone from improvement to improvement and, under the present Gas Convener, ex-Baillie Gowan, the same progressive policy was being pursued. From his experience in Perth he felt that gas and electricity were like two trains running on parallel lines. As gas expanded so did electricity; the people could not do without gas. In the field of street lighting there was nothing better than gas. The outlook, as he saw it, was not gloomy, but gas advertising must be improved to keep pace with electricity advertising campaigns. He was a great believer in the British Commercial Gas Association, but he did not think that they spent their money wisely. They advertised in the wrong places. Advertisements in the columns of the local newspapers of small villages would do much more good than a whole page in a London daily. In conclusion, Provost Hunter said that, on behalf of the Corporation of Perth and the Convener of the Gas Committee, he would like to extend to the members of the North British Association a very hearty welcome to the Fair City.

The President, in reply, said that he wished, on behalf of the Association, to convey the grateful thanks of the members for the cordial welcome. Mr. Bain then made reference to the valuable services which Provost Hunter had rendered, not only to the City of Perth, but to the Gas Industry as a whole during his successful period as Gas Convener.

The Hon. Secretary and Treasurer then read letters of apology from members and representatives of other Associations. Among those who were unable to be present was Mr. F. P. Tarratt, President of the Institution of Gas Engineers. Mr. Kellock also read a message which Mr. Vass had received from Mr. Taylor, the Secretary of the Gas Institute of New Zealand, in which greetings and good wishes were conveyed.

The President referred to the loss which the Association had sustained through the death of five members since the last meeting. Mr. W. Doig Gibb, the Senior Hon. Member, ably occupied the chair of the Institution of Gas Engineers, the North of England Gas Managers' Association, and the Southern Association of Gas Engineers and Managers. His services as a Consulting Engineer were highly valued throughout the country, and his work during the war on behalf of the Ministry of Munitions would long be remembered and appreciated.

Another member who had passed away was Mr. A.

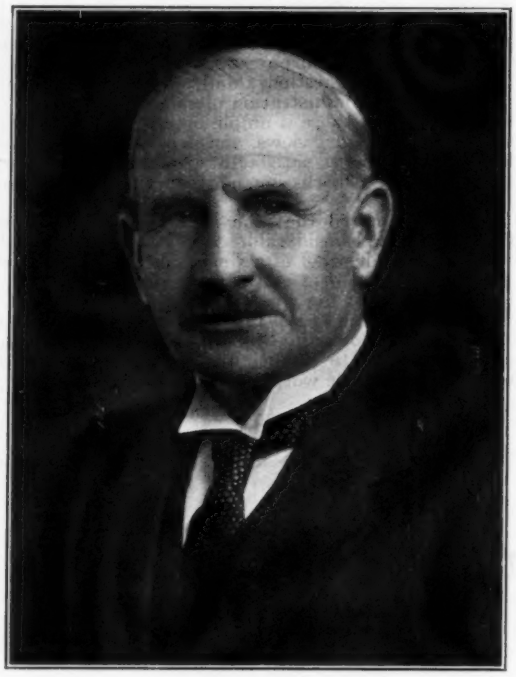
Nisbet, of Lochgelly, whose work, particularly in connection with public assistance, would be gratefully remembered.

The other members in whose memory the President requested a minute's silence were Mr. A. Russell (Glasgow), Mr. J. Robb (Glasgow), and Mr. W. C. Spence (Wemyss).

Presidential Address.

The President then delivered his Presidential Address, which will be found on later pages.

The Senior Vice-President (Mr. G. Bruce) said that it was his pleasing duty to propose a vote of thanks to the President. He had known Mr. Bain since he went to Cullen. Though it was unusual to discuss a Presidential Address he felt that it contained a few points which he would like to mention. The question of the merging of small undertakings was one which would soon have to be faced, and he was not in favour of amalgamation where inflated capital was necessary. From his experience



THE PRESIDENT,

Lewis Bain.

A native of Fraserburgh, Mr. Bain began his commercial career there with the Gas Light Company, serving under Mr. Lang, now of Alexandria, and Mr. Ritchie, now of Falkirk. He was appointed in 1912 to take charge at Cullen, where he has extended the gas supply to the neighbouring towns of Portknockie and Findochty. On the amalgamation some twelve years ago of the Banff and Macduff Works, he was also appointed Engineer and Manager of the joint Companies, and has since extended the supply from Banff to Whitebills. Served during the War, first as a non-commissioned Officer, and later as an Officer in the 9th, 15th, and 51st Divisions, and was commanding "A" Company of the 5th Gordons when demobilized in 1919. A Town Councillor and Magistrate of the Royal Burgh of Cullen.

amalgamation did not go with efficiency, since the spirit of the utility company was apt to be lost. The buying of small companies by London concerns was not good, as they did not have the same real interest as a local company. As regards the competition with electricity, he felt that the Gas Industry was partly to blame for the damage which had been done, as they only wakened up when the competition came. They must give good service when business was good. There was far too much conservatism in the Gas Industry; they were frightened to launch out and were afflicted with too much modesty.

The Junior Vice-President (Mr. J. Dickson) supported the vote of thanks and said that Mr. Bain was a man whom everyone admired. He did not consider that the fight against electricity was as easy as had been suggested by previous speakers. Gas was holding its own in some cases, but he felt that this might be due to an increase in the number of consumers. The best way to get a correct statement of the position was to consider the consumption per consumer. In his own district he had to contend with competition from the Clyde Valley Electricity Supply Company and in the last nine years he had been able to hold his own and had made an increase in output by giving good service, free maintenance, and liberal terms for cookers and appliances. The consumption per consumer, however, had not increased as it should have. Radio sets and vacuum cleaners were the two chief reasons for the increased demand for electricity. While this competition was formidable, he did not wish to appear pessimistic, as he was sure that all members of the Gas Industry were combating it most effectively. He was not a supporter of amalgamation, as he felt that if centralized buying resulted in cheaper prices, then large undertakings should supply the cheapest gas, and this was not the case.

Mr. Bain, in reply, said that in the case A cited in his address the population had actually decreased, but, despite that fact, the consumption had increased.

Nominations to Council.

Nominations for the vacant places on the Council were then taken, and the following were proposed and seconded: Messrs. H. A. Aitken (Leven), A. McDonald (Motherwell and Wishaw), James Barbour (Saltcoats), and D. M. McIntyre (Montrose).

Luncheon.

A luncheon, attended by 150 members, was held after the meeting in the Station Hotel, Perth. The top table consisted of the President and his platform party, with Mr. J. Bell (Dumbarton) and Mr. J. W. Napier (Alloa) in addition.

The toast of "The President" was proposed by Lord Provost Hunter, who said that he had known the President for 15 years. Success was attained by hard work and by gaining the esteem of colleagues. Mr. Bain, said Provost Hunter, had attained such a position, which he was most worthy to hold.

The President, replying, said it was gratifying to find that the Lord Provost was such an enthusiastic supporter of gas. He wished to thank him for his remarks and the members for their hearty response.

Visit to Perth Gas-Works.

After the luncheon the members paid a visit to Perth Gas-Works. Afternoon tea was served during the visit.

The first Perth Gas-Works were erected in Scott Street, and started in 1825. An opposition Company called the New Perth Gas Company erected works in Blackfriars in 1844. The two Companies carried on business till 1868, when an amalgamation was effected and Mr. Thomas Whimster became Manager of the two works with a combined make of 38 million c.ft. During the next five years the Scott Street Works were enlarged, and in March, 1873, the Blackfriars Works were closed.

Within a year (1874) the Perth Town Council took over the gas undertaking and continued gas manufacture in Scott Street Works till 1901, when the works at Friarton were opened.

In 1923 a bench of Glover-West vertical retorts, consisting of five ovens of 8 retorts each, was erected in the space formerly occupied by three arches of horizontal retorts, which gave a 34% increased capacity in a quarter of the ground area.

A new Peebles automatic station governor was installed in 1925, and in 1931 a Connersville station meter of 100,000 c.ft. per hour was fitted alongside the existing 80,000 c.ft. per hour wet meter.

On April 5, in very cold but dry weather, a golf competition was held over the King's Course at Gleneagles. There was a record turnout of 46 members.

The Winson Scott Silver Cup was won by Mr. E. V. Chalmers (Dunblane) with a score of 97 − 15 = 82. The first three handicap prizes went respectively to Mr. Chalmers, Mr. Peter Blackhall (Edinburgh), and Mr. Henry Rule (Bridge of Allan); and the Scratch Prize was won by Mr. James Brock (Glasgow) with a score of 80.

At the conclusion of play a short informal meeting was held. Mr. James Bell (Dumbarton), an ex-Captain of the Golf Circle, said that he had been called upon to fill the breach caused by the unfortunate absence of the Captain, Mr. John Wilson (Dundee). Mr. Wilson had not been in the best of health for some time, but was now well on the way to recovery. In asking the President, Mr. Lewis Bain, to present the prizes, Mr. Bell referred to the wintry weather and the well-known hazards of Gleneagles, which possibly were to blame for some of the scores.

Mr. Bain then presented the prizes, and in replying to a vote of thanks assured the members of a good game when they went to Inverness in September.

Presidential Address to the North British Association

By Lewis Bain, of Cullen and Banff.

In presenting to you my Presidential Address, allow me to express my deep appreciation and thanks for the honour conferred in electing me to the high office of President of this long-established Association.

Perhaps the question which is most engaging the minds of all who have the interests of the Gas Industry at heart is that of the growing competition with electricity. In this connection much is being done by our national bodies, which are deserving of our best support, to bring about improved legislation whereby we should enjoy at least equal privileges with those of our competitors. I maintain, however, that much can still be done by individual undertakings throughout the country by merging the small with the larger undertakings, or in a holding company. In this way many advantages accrue, such as joint buying of coal and other materials, pipes, fittings, and appliances in bulk. This would lead to considerable economies, and a good buyer could turn such a position to very great advantage. The joint selling of coke and other residuals should also produce increased revenue and avoid unnecessary competition, as well as enable the marketing to be done on better lines. Further economies would be possible, such as the employment of professional men, *e.g.*, experts on rating, income-tax, &c., who would naturally undertake the work in connection with a group of undertakings at much lower fees than if each one had to be dealt with separately. Similarly, insurance premiums would be lower. In fact, if well managed, there is scarcely any aspect of gas manufacture or supply which would not ultimately show very considerable economies by the formation of a holding company. Moreover, it enables undertakings to plan a long term policy covering a large area.

One has to bear in mind, however, that it is not always possible, owing to geographical situation, to merge with neighbouring undertakings, but the fact remains that throughout the country centralized administration and control by large holding companies have proved to give rise to material economies, greater than had been anticipated. The supply of gas in bulk to smaller undertakings is also proving an important factor in reducing costs. I have in my mind at the moment the case of one undertaking which was making 12 million c.ft. of gas, selling at a price of 8s. 4d. per 1,000, which took a bulk supply from a larger works in 1921 and is now sending out 19 millions at the reduced rate of 5s. 7d. Another instance occurs to me of a very small works where in 1925 a bulk supply was taken, before which 6 millions were sold at 8s. 4d. per 1,000, whereas last year 8½ millions were delivered, despite adverse local conditions, at 7s. 6d. per 1,000. Beyond these figures, the smaller works quoted have had the advantage of calling upon the larger undertaking for advice on various questions, such as the laying of mains and services, apparatus for consumers, &c., and in addition have had the benefit of an up-to-date showroom from which consumers may make purchases of modern appliances. Moreover, the quality of gas has been more regular than formerly, and the fact of the official in charge being relieved of gas making has allowed him more time to devote to distribution work. A bulk supply is not in every case, however, a guarantee of reduced costs, as this will largely depend upon the length of mains required to link up with the larger works, but the other advantages make it worth while.

Position of the Small Undertaking.

It must not be assumed that I am taking too pessimistic a view regarding the position of the smaller undertakings against electricity; far from it. The foregoing few instances of smaller undertakings, which I have taken at random and which speak for themselves, go to prove that, notwithstanding the introduction of electricity, with its attractive methods of charging, the demand for gas continues to increase.

Town.	Annual Make in Millions of C.Ft. at Time of Introduction of Electricity.	Date of Introduction of Electricity.	Annual Make in Millions of C.Ft. in 1933.	Increase.
A	20½	1900	53⅞	% 162·2
B	35½	1923	51½	45
C	2½	1903	6½	160
D	47½	1923	100½	111·6
E	31½	1901	81	157·1
F	74	1929	79½	7·4
G	50	1905	94	88

Scotland possesses a larger proportion of small undertakings compared with England. The number may be stated as follows:

Under 10 millions	60
From 10 to 20 millions	51
,, 20 to 30 ,,	23
	134

I have in mind the particular example of a works with the remarkably small output per annum of 6½ millions—a district of a high class of resident, purely residential, and with a complete absence of industry. The first point to be noted is that electricity has been available for 25 years. The sale of gas 25 years ago was 2½ millions, to-day it is 6½ millions—a small increase in amount, but definite progress nevertheless, the price of gas never having been below 5s. 10d. per 1,000. The works have been efficiently maintained, and recently a substantial sum was spent in renewals and additions. Dividends of 5% have been maintained throughout the whole period, and the Company's shares are considered to be a good local investment. The case quoted is an extreme one, being at the bottom of the scale of what is meant by a small works.

My own experience over a period of 21 years is of what, to begin with, was a village (albeit a Royal Burgh) works with an annual make of only 2½ million c.ft. Cullen Works, which in the year 1912 supplied that town alone, extended the supply of gas to two neighbouring towns—2 and 4½ miles distant respectively. The annual make in 1933 has risen to 25 millions, and the price has been reduced to 5s. 10d. down to 4s. 2d. according to consumption, compared with 7s. 6d. in 1912. Banff and Macduff each had their separate works up to 1921, when the respective makes were 13 and 6 millions at the rates of 8s. 4d. and 9s. 2d. respectively. In 1922 the latter works was demolished, the Banff works remodelled, and a supply extended to Macduff. The combined annual make, which now includes the village of Whitehills, being an extension of supply some 3 miles distant, now amounts to 27 millions and the price is reduced to all three communities to 6s. 3d. down to 4s. 2d. according to consumption. The area as regards gas supply has been co-ordinated under one administration and management. As further evidence of the progress of the sales' side of the smaller undertaking, I find on an analysis of the output of 60 works making under 40 millions per annum that, over a period of ten years, the sales have increased by 31%.

I am anxious to remove any wrong impression which may exist that the small gas-works is not an economic concern, and that generally it does not follow modern practice in manufacture and sales. Handicapped with a high price, this disability has been overcome by efficiency and service to consumers. The success of the smaller gas-works is an interesting and valuable proof that gas as a public utility is a well-secured investment and that, in Scotland at least, gas is still in favour.

Statutory Undertakings.

The complete freedom from control or restriction in the supply of gas by the non-statutory undertaking has now reached a visible end by the appearance of the Gas Undertaking Bill, 1934. The Bill, it should be noted, is likely to become law this year, and the present proposals may be amended. The surprise is that control of gas supply as a public utility with regard to quality, pressure, and purity has not come about long ere now. The new legislation will be accepted with, I feel sure, complete unanimity, and there need be no fear of any regret on the part of the gas undertakings affected. It is entirely anomalous that gas supply in Scotland under municipal control should be subject to legislation for the protection of consumers, and that private company supply should be free from any control whatsoever. I should like it to go forth from this meeting that the Gas Industry in Scotland, represented by the smaller gas-works, welcome and appreciate the proposed legislation which will be all for the advancement of gas supply to domestic and industrial consumers.

The clauses in the Bill may be shortly summarized. The

effect on small gas-works is to put them into three classes, namely:

(1) Gas-works supplying more than 30 millions per annum
(2) " " " " 20 " "
(3) All non-statutory undertakings irrespective of output

It is presumed that the word " supplied " in the Bill means " sold " and not merely output from the works, which would effect a distinction in the size and number of undertakings to be included. In the case of undertakings supplying more than 30 millions, the provisions are as follows: The Board of Trade may at any time after the end of the first of those years in which those undertakings supplied more than that quantity of gas, before the expiration of the two next following years, serve a notice under Section 7, provided that no such notice shall be served before the first day of January, 1936, and the Board shall not be required to serve any such notice before Jan. 1, 1938. If on application by a Town Council or County Council to the Board of Trade at any time after Jan. 1, 1939, in the case of a non-statutory undertaking supplying gas within the area of the applicants more than 20 millions per annum, that the supply was insufficient or otherwise unsatisfactory, and that at the date of application no sufficient steps had been taken to remedy the matter, the Board of Trade shall serve a notice under Section 7 upon the undertaking concerned, and it will thus be observed that protection of gas consumers' interests can be forced upon a non-statutory company by a Town or County Council.

It is of some importance to note what will be required by small undertakings, and the terms of the notice under Section 7 of the Bill. The Section requires the undertaking, within six months, to make application to the Board of Trade for a special order under Section 10 of the principal Act containing provisions:

(*a*) Specifying the area of gas supply.
(*b*) Applying the provisions of the Gas-Works Clauses Act, 1847, and the Gas-Works Clauses Act, 1871.
(*c*) Requiring undertakers to charge for gas on a thermal basis.
(*d*) Regulating the capital of the undertakers, dividend payable, and the price of gas.

Section 8 of the Bill provides certain requirements to be observed by all undertakings irrespective of size, which will include, of course, those under 20 millions per annum which are not thermal unit undertakings; these requirements refer to purity and pressure only, with a particular reservation as to purity only. The conditions are:

(*a*) Gas supplied shall not contain any trace of sulphuretted hydrogen when tested by the prescribed method; and
(*b*) Gas shall be supplied at such pressure in every main and in every service pipe having an internal diameter of 2 in. or upwards, at not less than 2 in. water gauge.

The exception is that where any non-statutory undertaker has not supplied more than 20 million c.ft. of gas in any of the five years immediately preceding Jan. 1, 1939, the requirement as to purity shall not apply until the end of the first year after Jan. 1, 1939, in which they supply more than that quantity of gas.

Section 9 of the Bill requires all non-statutory undertakers to give to the Board of Trade an annual return of gas supplied.

It may be that Directors of small company undertakings may feel inclined to raise objection to the dividends of the shareholders being controlled, but this position cannot be defended in these days when protection of public interests is being more and more directed by Parliament. The new conditions are inevitable, and after a short experience I feel sure that the protection of the consumer will provide an additional security for the public in gas investments, and so render the investment more valuable.

Efficiency of Small Works.

Managers of small works are now recognizing the need for greater efficiency in gas production. Propaganda and sales of appliances are comparatively easily met by sound application of the personal factor in influencing an extended use of gas for heating and cooking. The one outstanding point deserving of first attention is the price of gas. The small undertaking in relation to larger works is face to face with the cost of production of gas. The lighting load is comparatively easy to maintain, as in small households the gas account is not a serious amount even with gas at 5s. 10d. per 1,000 c.ft. It is in the extension of the use of gas for the domestic load of heating and cooking that the difficulty is greatest. Efficient sales organization is as easily attained with the small works as with the larger works. This statement may not be accepted in the higher circles, but I can definitely state that it is the case. The small works ought not to be any worse off in this respect; only apathy and indolence can cause it to be otherwise.

It is with pleasure that I am able to state that the two Company Undertakings under my management have always contributed the full rate of subscription to the national bodies. There is personal satisfaction that the work of the B.C.G.A. has been paid for relatively with the benefit of all the influences and advice, as also the technical work of the Institution of Gas Engineers, and the administrative labours of the National Gas Council.

I am strongly of the opinion that the small works can best be put into a strong position by good practical methods of economic gas manufacture. The circumstance of the manufacture of a product for sale to the public in small and limited quantity is an obstacle to low works costs. The need for a fresh consideration of gas making plant should be given serious attention, and particularly the scrapping of small units of gas retort plant. There are available several alternative processes, *e.g.*, complete carbonization plant with a low calorific value of, say, 350 B.Th.U., and coal gas retorts with water gas plant producing a quality from 450 to 500 B.Th.U. I am bound to state that a low quality of gas—and I mean by that under 400 B.Th.U.—is not one that appeals to me as the most satisfactory gas for public supply. I am not convinced, from a perusal of costs, that a low quality gas from producer plant operating with coal and using steam, but not reaching to the stage of complete carbonization of all the coke, helps towards the reduction in prices to the consumer. Moreover, I do feel that a high quality of gas, say, from 450 to 500 B.Th.U., is an all-round better article and can be used with greater satisfaction by the small quantity consumer, and this particularly applies where the price is considered high.

Water Gas Plant.

Blue water gas is the ideal coal gas diluent. Its use in small works has often been found to incur extra labour charges due to the use of very small hand-operated plants. The latest automatic plant overcomes this objection, the only attention required being five minutes every two hours for charging, and say half-an-hour a day for clinkering and lubrication. It will be readily seen that such a plant can be operated by the stoker, and in fact should considerably lighten his duties in gas making. Owing to the regularity of production of gas, the automatic plant may be used with or without a relief holder, relying on the exhauster governor to take up variations of gas production. Among the advantages of such a plant the following may be noted:

(1) The malpractice of introducing inert gases into the coal gas in order to bring down the quality is eliminated, and, at the same time, more efficient carbonization of the coal in the retorts is obtained.
(2) A more accurate control of the quality of the town gas is obtained by varying the quantity of B.W.G. admitted.
(3) The consumption of coal in the retorts and consequent production of coke is reduced in proportion to the B.W.G. made, and in addition a further quantity of coke is used for the production of the B.W.G., thus eliminating stocks of coke and lowered prices required to dispose of the surplus.
(4) Where the coal has a high transport charge this cost is considerably reduced by making the coke into gaseous therms. In the North of Scotland the railway dues for coal vary from 10s. to 13s. per ton. It will be realized that the use of coke made on the works for gas production has definite commercial advantages.

The new plant at Banff, the first of its kind in Scotland, was installed by Messrs. Humphreys & Glasgow, Ltd., and has been working smoothly since its erection without a relief holder; it has solved to a very large extent the surplus coke question. The capital expenditure involved is relatively small and is, therefore, within the reach of the smallest undertaking. Results on the Banff plant have not been compiled owing to the short period of working, but from experience with other plants of the same kind at least 59,000 c.ft. per ton of coke, of a calorific value of 291 B.Th.U. may be expected. A guarantee of 80,000 c.ft. capacity per day is given with the Banff plant, but this capacity can be considerably reduced without loss of efficiency when such is desired. It will be seen that with a plant of this type a very great increase in flexibility of gas output and quality is obtained, with consequent saving in fuel and labour. The plant works on the same principle as that used on larger works, but in a very much simplified form; only three control levers are used, one operating the blast valve, the second the stack and steam valves, and the third the reverse make valve. The automatic gear is driven by a small gas engine which also drives the fan for the generating blast. The drive is taken through a small

clutch. In the event of any valve sticking on the plant, the clutch slips and the automatic gear stops. At the same time a centrifugal switch comes into action, which, operating an electric hooter, continues to blow until the plant receives attention. In order to stop the plant, this clutch is thrown out by a lever and put in for starting. The proportion of blow to run and down run can be altered to any degree by adjustment of the operating cams. The down run valves are locked with the blast, so that any chance of the valves coming into a dangerous position is eliminated.

Electricity and Gas.

Electricians are at work all the time to create an atmosphere hostile to gas. Up and down the country they are representing that gas is associated with bad housing conditions, that the use of gas is a thing of the past, and that there should be electrically equipped houses in order that tenants may enjoy the privileges of the rich and have electricity for all purposes. It is almost invariably found, however, that consumers are largely in favour of gas, and this can be tested out in any housing scheme if a tenant is allowed freedom of choice. Tenancy agreements containing provisions for the exclusion of gas are one of the things which the Gas Industry has definitely got to fight.

In towns where the electricity undertaking is municipally owned and the gas undertaking is controlled by private enterprise, fair competition is extremely difficult to obtain, especially when pronounced biased influences, clothed in the mantle of pseudo public service, are exerted by over-enthusiastic civic heads in favour of electricity. Instances are known where, despite obvious economic factors, gas undertakings have been deprived of the whole public lighting and other municipal business on the pretext that the municipality was honourably and morally bound, in the interests of the ratepayers, to support the " child of their adoption " (the electricity department), irrespective of any adverse effect which such a step may have upon the municipal exchequer. One such instance comes readily to my mind. A small company-owned undertaking, with an annual sale of 35 millions, and paying local rates of over £1,000 per annum, found itself in the unfortunate position of having to combat such influences. The Company was deprived of the street lighting and the lighting and heating of all municipal institutions, entailing a loss in revenue to the undertaking of approximately £600 per annum, despite the fact that it had been conclusively proved that the services of gas in the circumstances were actually very definitely in favour of the municipal finances. Albeit it was argued that the justification for adopting electricity lay in the fact that the civic fathers were directing business the way of another undertaking which was being run " by the people for the people." Politically this may or may not be considered a sound argument. Had this ended the activities of biased influences one would be inclined to be less bitter, but in the same town the municipally-controlled housing schemes were converted from gas to electricity at the town's expense, and tenants of the houses were given to understand that the Town Council, as nominal owner and landlord, expected tenants to make full use of the new service.

Members of Town Councils who are medical practitioners may, if they so choose, exert a big influence on public opinion if they happen to be biased in favour of our competitors. Knowing, as we do, the traditional reverence, esteem, and, too often, awe in which ministers of religion and doctors of medicine are held in the minds of the average man in the street, can it be wondered at if their opinions and dictates in matters associated, even in a remote way, with their profession are listened to and absorbed as authoritative matter that " daurna be disputed?" A doctor may readily expound the vital necessity of oxygen to life, and follow his statement by reference to the use of oxygen in the consumption of gas in such a manner as will prejudice the patient against gas-consuming appliances of all kinds. Surreptitious propaganda of this kind in favour of electricity is more damning to our business than all the newspaper advertisements which the electrical industry dare to insert, and it is difficult to counteract such effects, since they are backed by the professional status of an individual whose statements in matters appertaining to public health are regarded by many as authoritative and beyond question.

I am quite satisfied that, if only we can make the public gas-minded as the electrical industry is trying to make them electrically-minded, by bold statements, setting forth the advantages of gas without exaggeration, and if such statements are pushed home with pertinacity until they get into the minds of the public, we shall obtain the results we all desire. Gas is not, as our electrical friends would wish people to believe, a thing of the past, a back number, a dying industry. The Electrical Development Association has a perfect right to advertise and follow the example which the Gas Industry has set for many years, but they are very clever in their methods and extravagant in their claims. The Gas Industry's propaganda should take the form of enlightening the public as to the true position, pointing out that the " Grid " comes into operation at the end of 1936, and that thereafter electricity must of necessity be increased in price. We welcome, therefore, the continued efforts of the N.G.C. and the B.C.G.A. Press propaganda with the object of dispelling the idea that electricity is the " fashionable " fuel. Lectures in schools, rotary clubs, public libraries, and suitable training courses in domestic gas salesmanship are all on the correct lines, as also are the courses for fitters, who after all are more in touch with the consumers than any others.

Education.

The Education Scheme has been in operation for ten years, and may now be said to be working smoothly. The record is one of steady progress, although as far as Scotland is concerned it cannot be said that a large number of students have taken advantage of the opportunities afforded them. It is the case, however, that because of geographical considerations and the incidence of population, the operation of the scheme tends to be centred round the cities of Glasgow, Edinburgh, and Dundee. In even the latter two cities there is evidence of some difficulty in bringing forward year by year a sufficient number of fresh students to maintain the classes in the principal subjects—Gas Engineering and Gas Supply. The grants made by the Education Fund have been very useful in making it economically possible for the Central Institutions to maintain these classes. Gas Engineers and Managers in towns reasonably adjacent to these cities could greatly assist by encouraging suitable young men in their employment to attend the Approved Courses of Study. The advantage to all concerned is obvious. The position of students who, because of distance, cannot attend the Colleges having Approved Courses still gives cause for concern. One does not wish to see a canalization of the certificated men in and around cities, with a loss to the Industry of all the possibilities and potentialities of those trained in country towns and undertakings. The number of external students is diminishing, and it almost seems that they are not facing their difficulties with that courage which has been a national characteristic of the Scot determined to acquire knowledge.

I do feel that insufficient regard is paid to the possibilities of instruction offered by Continuation Classes, which are provided in every town, even those of comparatively small size. Full use should be made of these classes instead of too great a readiness to adopt correspondence classes at a stage earlier than should be necessary. While I do not belittle correspondence classes, which are well conducted and do very good work, I hold that they cannot replace the discipline and valuable personal contact with the teachers that is obtained by attendance at classes. Also, external students when embarking on a course of study should take advantage of the existence of the Advisory Committee, which is always willing to give guidance and assistance so far as lies in its power. One has a feeling that many Engineers and Managers are a little apathetic in this matter. They should greatly assist by taking a real interest and encouraging young men who show indications of responding to ambition's spur. A live, active, regular interest in the students' progress should be taken, and a ready willingness shown to advise and encourage by giving every opportunity to advance knowledge in their academic studies, works, and distribution practice. It is of extreme importance that the Gas Industry should enrol in its ranks young men of sound preliminary education, and that their training should be carried out on sound, thorough lines. Only by so doing can good results be obtained.

The Education Fund promoted by this Association (the annual sum contributed by Scottish gas undertakings is about £300) has proved of great benefit in assisting Technical Colleges to add to their equipment, and in assisting teachers to attend Special Teachers' Classes, and in aiding students in many directions. The Association is always willing to consider additional methods of making use of the Educational Fund in directions advantageous to the Industry and Students.

The object of the Approved Course of Study is to enable students to acquire knowledge of scientific fundamentals on which gas practice is based, but it seems open to argument if this object is not in part defeated by the inclusion of too many ancillary subjects in a five years' course. Concentration on the essential basic subjects would, I think, be an advantage and prevent an inclination on the part of students to look upon the ancillary subjects as secondary. This matter is far from simple, as properly trained gas engineers require knowledge of chemistry, physics, and engineering science—a good deal to be acquired in a set course covering the comparatively short period of five years. Too great emphasis cannot be laid on the wisdom and neces-

sity of students continuing their studies beyond that period, so that their knowledge may be enlarged and deepened.

In Scotland where the number of small and medium sized undertakings is large, the majority of students seem more intent on the certificates in Gas Engineering, and candidates in Gas Supply beyond the Ordinary Grade are rather few. This view is short-sighted, as present-day conditions more and more increase the importance of the distribution side, with a corresponding increase of opportunity for well trained men on that side. The assistant manager in distribution will probably be of more importance in the future than the assistant on the engineering side, and this as regards provincial works in particular. I should therefore strongly advise more students to take the Higher Grade Certificate and Diploma in Supply, and the Industry must see to it that promotion, opportunity, and fair remuneration are given to those whose efforts have qualified them to contribute valuable service. The men are being trained and qualified, and it is obviously an advantage that they should be absorbed in spheres where they can perform their best work.

The future of the Gas Industry will be secured if developments proceed on a sound national policy, and if the individual undertaking applies to itself up-to-date technical methods and salesmanship. We are masters of our own profession, and individual worth and individual influences will be the principal factors in forwarding and preserving the Gas Industry as a cheap fuel producing industry—an industry of valuable economic worth to the nation as a user of coal in huge quantity, and in putting chemical products into commercial industry. The Industry is highly organized, in science, in education, commercially, and in salesmanship, and all these qualities are a striking testimony to the spirit of our progress.

Coke Production in Horizontal Practice*

By JOHN K. MITCHELL, Assistant Engineer and Manager, Brighouse Corporation Gas Department.

To us, as coke manufacturers, two factors of first importance are:

(1) Cost of production.
(2) Quality of fuel produced.

It is impossible in a paper of this nature to deal comprehensively with these subjects, but I propose to discuss various aspects of them, with particular reference to our experiences at Brighouse.

COKING OF COAL.

Let us first consider broadly some of the principles underlying coke formation. For present purposes coal may be taken as consisting of two portions.

(1) A portion which is infusible at carbonizing temperatures and consisting of "inerts."
(2) A fusible portion consisting of "agglutinants."

Then, the coking of coal is essentially the binding together of the inerts by the residue produced by partial thermal decomposition of the agglutinants. The actual mechanism of the process is open to conjecture, but it is established that, on heating, coal is reduced to a plastic mass; volatile matter is driven off, accompanied by frothing of the mass; and eventually a soft semi-coke is produced. Further heating then produces decomposition of the cementing bond resulting, first, in the production of a much harder coke, but, finally, causing disintegration. Coking is at once a physical and a chemical process, and the fundamental qualification for the production of a coke is that the ratio of the inerts to the agglutinants in the coal must lie within a limited range, an excess of either rendering it non-coking. Incidentally, this range of ratios is not the same for all coals, nor need it always be the same for any particular coal, since it depends very largely on the condition of the inerts it contains.

At the same time many non-coking coals may be made to produce good cokes by blending with other coals such that the ratio of inerts to agglutinants in the aggregate falls within the necessary limits for coke formation. So long as this condition is fulfilled a big variation in the characteristics of the fuel produced can be obtained by simply altering the proportions of the blend and thereby varying the ratio of the inerts to the agglutinants.

PERIOD OF CARBONIZATION.

A feature of any system of bulk carbonization is that the heat must attack the outsides of the charge first and thence penetrate inwards to the core. Thus the period required for the carbonization of a charge is the time taken for the heat to travel from the outside to the core, and this depends on a number of factors:

(1) *Thermal Conductivity of the Charge.*—This depends entirely upon the coal and is influenced by the size, moisture content, volatile content, and temperature of decomposition.
(2) *Depth of the Charge.*—This affects the depth to which the heat is required to penetrate. For reasons of economy and efficiency it is desirable that heavy charges only should be used, and, therefore, this factor may be neglected.
(3) *Temperature of the Retort.*—Since we are considering only high-temperature carbonization at combustion chamber temperatures of 1,380° C. to 1,400° C., this factor may also be neglected.

Thus, the thermal conductivity of the coal is the only satisfactory medium whereby the time required for the carbonization of a charge may be controlled. This is of utmost importance, since any reduction of carbonizing period which might be obtained by an increase of thermal conductivity results in an increased throughput of the retort and might thus bring about a reduction in manufacturing costs.

As a matter of fact, a considerable difference is to be found in the times required for carbonization of different coals and of different sizes of the same coal. In particular, many non-coking coals of high volatile content—say, 38-40%—will carbonize much more rapidly than, for example, the normal South Yorkshire coking coals of 33-35% volatile content. Now, if such a non-coking coal is mixed with a coking coal in a proportion suitable to the formation of a coke, the time required for the carbonization of the blend may be less than that required for the carbonization of the neat coking coal.

COKE STRUCTURE.

Here, however, a further factor is introduced—namely, coke structure. This is influenced in the first instance by the ratio of the inerts to the agglutinants in the coal, any excess of either tending towards the production of a denser, less swollen coke. In addition, however, it is considerably affected by the rate of carbonization, because, as the volatile matter is driven off from the plastic coal during carbonization, frothing and bubbling is caused, and the degree to which this takes place depends directly on the rate at which gas is driven off. Further heating then reduces the mass to a spongy semi-coke, the structure of which depends on the amount of frothing of the plastic coal and, therefore, on the rate of carbonization.

To sum up, therefore, when a quick carbonizing, high-volatile, non-coking coal is mixed with a normal coking coal:

(*a*) The maximum quantity of non-coking coal which may be used is such that the ratio of the inerts to the agglutinants in the blend is within the limits necessary for coke formation.
(*b*) The primary effect is to produce a blend whose rate of carbonization is higher than that of the neat coking coal.
(*c*) The structure of the coke produced is capable of great variation through the media of (1) the ratio of inerts to agglutinants in the blend; (2) the carbonization rate of the blend.

These statements contain the basic principles of coal blending as applied to horizontal retort carbonization.

COAL BLENDING.

A short while ago we carried out at Brighouse an investigation of the possibilities of coal blending, our efforts being directed towards:

(1) Reduction of the carbonizing period from 12 to 8 hours per charge.
(2) Production of a fuel suitable for combustion in domestic grates.

While the former is achieved simply by increasing the rate of carbonization of the charge, in the production of a domestic fuel there are two special factors to be considered—namely, structure and volatile content. An open structure, on account of its effect on ignitability and combustibility, is of primary importance to coke for domestic use, and, therefore, the ratio of the inerts to the

* Paper before the Yorkshire Junior Gas Association, March 24, 1934.

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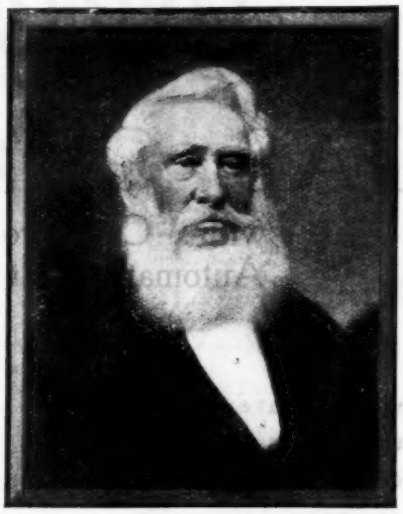

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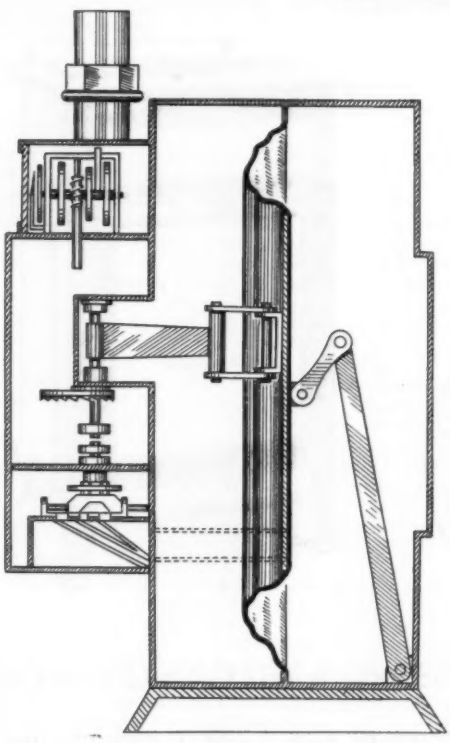

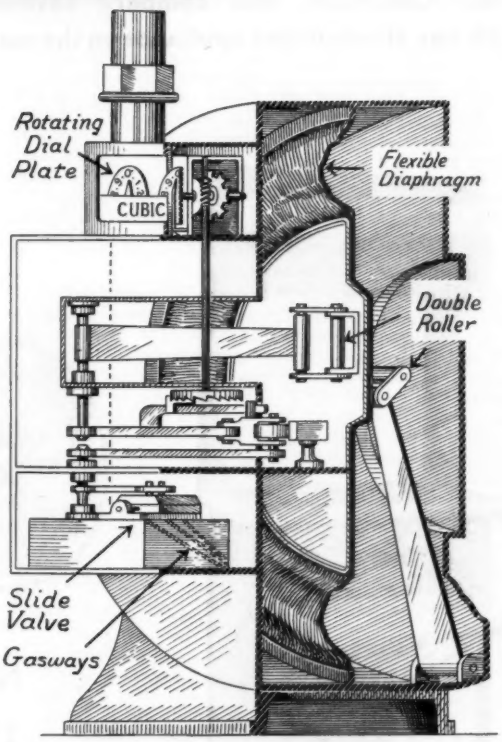

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agglutinants in the blend, together with the carbonization rate, must be adjusted to give this result under the conditions of carbonization ruling. On the other hand, with regard to the volatile content, it has been established by the Fuel Research Board that unless this exceeds 3% there is little appreciable improvement in ignitability. It is, however, impossible in horizontal retort carbonization to produce coke of such a volatile content consistent throughout the depth of the charge, because, since carbonization proceeds inwards from the outside to the core, that coke on the outside is inevitably subjected to greater decomposition than that at the core. In view of these facts we may conclude that the greatest success in the production of domestic coke by high-temperature carbonization depends on the structure.

In carrying out our experiments the first procedure was to try a number of blends of coking and non-coking coals in our 1/1,000th ton coal testing plant. Then, after consideration of all factors, one coking coal, which we shall term A, and one non-coking coal B were selected for works scale experiments.

It was eventually found that a mixture of 40% of A and 60% of B gave the best results, the blend being completely carbonized in 8 hours, while the coke produced was of open structure and perfectly suitable for domestic grates, requiring for ignition little more than half the amount of gas necessary for the ignition of our ordinary 12-hour coke. A 50 : 50 blend of these coals was carbonized in 8 hours, but the structure was little different from that of the normal 12-hour, indicating that the carbonization rate was too low on account of the amount of quick carbonizing coal being too small. On the other hand, a blend of 30% of A with 70% of B was found to be carbonized in 6 hours, but again the structure was found to be dense and not the most suitable for domestic use, due to the predominating influence of the non-coking coal.

Following our experiments with these mixtures a number of other blends were tried. The general conclusions were:

(1) If blending is employed solely for the purpose of reducing the carbonizing period—say, from 12 to 8 hours as in our experiments—a wide range of proportions of the constituents of the blend may satisfactorily be used.

(2) If it is desired to produce an easily ignitable domestic coke, accuracy of blending is essential.

In the example cited previously, of the coking and non-coking coals A and B, satisfactory carbonization and coke production in 8 hours was obtained in the case of all mixtures within the limits of the 50 : 50 and the 30 : 70 blends, but by far the best domestic fuel was obtained on carbonization of the 40 : 60 blend only.

(3) The primary disadvantage of coal blending is that, generally, the actual blending must be done at the gas-works, and there thus arises the necessity for the provision of special hoppers and handling plant. Such a necessity could, however, easily be avoided if the colliery companies were to market blended coals.

Quality of Coke.

In consequence of present-day competition from other fuels it is essential that the coke which we produce should be of the highest quality. I suggest that great attention must be directed along the following lines:

(1) *Choice of Coals (or Blends).*—The effect of coals and blends on coke structure has already been discussed, but another direction in which the coke is influenced is in its ash content. For the efficient combustion of any fuel it is essential that sufficient air to provide the necessary oxygen should come within the reach of every molecule of the fuel; and if for any reason this condition is not fulfilled, incomplete combustion results. One of the principal causes of inefficient combustion of a solid fuel such as coke is the presence of ash or clinker, trouble from the latter being specially acute where high rates of combustion are required. It is essential, therefore, that not only should the ash content of the coke be as low as possible, but also that the fusion temperature of the ash must be as high as possible. In this instance I must emphasize that the colour of the ash obtained from a proximate analysis does not form any reliable guide to its fusion point, and thus the only satisfactory procedure is to carry out a complete fusion test. From our experiments we have concluded that the maximum permissible ash content in any coal is 5% (dry basis) and the minimum fusion temperature 1,200° C.

A point which must not be overlooked is the distribution of ash in various sizes of coke. Coal ash may be divided into inherent and extraneous ash. The former was present in the original coal-producing bodies and is eventually found intimately associated with the coke. The extraneous ash, however, consists of roof, dirt, &c., entirely foreign to the coal proper, and on carbonization results in the formation of scales in the coals. These then produce planes of weakness across the coke structure and thus tend to cause fracture, being frequently freed themselves from the surrounding coke structure. While unnecessary breakage may therefore occur, a factor of much more importance is the concentration of scales which occurs in the smaller sizes of coke. In this connection I may say that it is our experience that trouble from this source is almost entirely eliminated by carbonizing washed slacks.

(2) *Efficient Cooling or Quenching.*—In order to ensure easy ignitability and good combustibility, especially in a domestic grate, it is essential that free moisture in the coke should be as low as possible. I have found that the presence of 5% of moisture is sufficient to nullify the other necessary qualities of a specially manufactured domestic coke.

The moisture in the coke depends on the efficiency of the quenching or cooling plant. A number of processes are in operation, but the one which has proved most successful for us is to quench with water, treating the coke in specially designed quenching boxes so constructed that the sides form water jackets having perforated inner plates through which the coke is sprayed. Very consistent and efficient quenching is obtained and this claim is justified by figures which I shall quote shortly.

(3) *Accurate Sizing and Grading.*—Apart from the advantage which one particular size of coke might have over other sizes for a given application, and the consequent desirability of having suitable sizes of coke available for sale, coke screening is essential, as it affords a means of separating the poorer quality from the better quality material. According to present practice at Brighouse a part of the total coke made is fed hot direct from the retort to the producer, while the remainder is quenched and graded for sale. The principle of straight screening is in operation, and by this the smallest size is taken out first, then the next larger, then the next, and so on.

Under these conditions it is found that the coke contains moisture and ash in proportions similar to those given below.

—	Large. Over 2½ In.	Domestic. 2½ In. by 1¼ In.	Smithy. 1¼ In. by ⅝ In.	Beans. ⅝ In. by ¼ In.	Breeze. Below ¼ In.
% Moisture. . .	0–1	3–5	6–10	8–15	15–25
% Ash (dry basis).	7	8–10	10–12	10–15	15–20

These figures clearly indicate how the quality of the fuel falls off rapidly as the size is reduced, due to the concentration of moisture and ash which takes place in the smaller sizes. It will be noted, however, that that coke available for sale which is over 2½ in. in size contains only 1% of moisture and 7% of ash, and it would appear that if this material were put through a coke cutter the quality of the small coke so produced would be far superior to that of the coke produced by screening only. This suggests that a far better method of coke treatment than that of straight screening normally practised is to pass the whole of the coke produced over a scalping screen and to separate in the very first instance the material under, say, 2 in. or 2½ in. from the larger material. The latter fuel is then put through a coke cutter and, finally, graded for sale, while the former, after a second screening if desired, should be used as far as possible on the works only.

A further disadvantage of straight screening is the unnecessary wear and tear occasioned by the large coke having to travel the whole length of the screens. This may, however, be eliminated by designing the screening plant so that the largest size is taken out first, in exactly the reverse of normal procedure. Incidentally, it is hoped that screening plant designed along the lines indicated will be put into operation at Brighouse during the coming summer.

In conclusion, I wish to express appreciation to my Chief, Mr. C. R. Ingham, Engineer and Manager of the Brighouse Corporation Gas Department, for the facilities which I have enjoyed during the preparation of this paper.

Declared Calorific Value.

Halesowen Gas Company.

Notice is given by the Halesowen Gas Company that as from July 1 next they will supply gas of a calorific value of 475 B.Th.U.

Solihull Gas Company.

As from July 3 next, the Solihull Gas Company intend to supply gas in the Shirley area of a calorific value of 500 B.Th.U. in substitution for the 475 B.Th.U. now being supplied.

GAS MARKETS & MANUFACTURES

Stock Market Report.

[For Stock and Share List, see later page.]

Despite the short week after the holidays, which somewhat curtailed business, there was a general feeling of optimism at the close on Saturday, and more active conditions are anticipated for the new Account. The features were the Government's new 3% Funding Loan issue and the large speculative movement in West African gold-mining shares. The former led to some hesitancy and curtailment of business in the gilt-edged section, which will probably remain a quiet market until the Budget secrets are revealed on the 17th of this month.

A strong tone was maintained in the Gas Market, while a fair amount of business was transacted. Prices generally were again firmer and led to several upward movements in quotations. Preference and debenture issues were the main participants. Among the former, South Suburban 4% gained 5 to 105½; Tottenham 5% and Uxbridge 5% both rose 2 to 114½, at which price the yield is still attractive at £4 7s. 4d.%; while Wandsworth 5% hardened to 120¼, the yield in this case being only a trifle over 4%. Among debentures, South Suburban 4% gained 4 to 105½; South Metropolitan 5% redeemable (1950-60) rose 2½ to 115½; and, on the local Exchange, Bristol 5% made a similar advance to 124. It will be seen also from the Stock and Share List that several other smaller improvements were recorded. Among ordinary stocks, Newport (Mon.) 5% maximum was the chief feature with a gain of 3 to 107 on the Bristol Exchange.

The Directors of the Wandsworth and District Gas Company have issued £208,300 4% perpetual debenture stock, the whole of which has been sold to Messrs. Seymour Pierce & Co., of 5, Lothbury, E.C. 2, at 104½% for payment in full on May 1 next. The new stock ranks *pari passu* with the existing £1,317,964 5% perpetual debenture stock, and will be registered and transferable in multiples of £1. Interest is payable on Jan. 1 and July 1, the first payment being two months' interest on July 1 next.

The recent suggestion put forward by a correspondent to the *Times* for an enlargement of the field of investment by trustees will doubtless be welcomed by many. When it is borne in mind that the preference issues of comparatively small water companies come within the Trustee Act, it is not easy to understand the exclusion of gas debenture stocks. It will be realized, however, that assuming these and the debenture stocks of other public utility undertakings were added to the "authorized" list of investments, it would make little, if any, change in the yield obtainable on trustee stocks generally.

Current Sales of Gas Products.

The London Market for Tar Products.

LONDON, *April* 9.

The current prices for tar products are at about the following levels:

Pitch, 57s. 6d. per ton f.o.b.
Creosote, 3¼d. to 3½d. per gallon.
Refined tar, 4d. to 4¼d. per gallon in bulk at makers' works.
Pure toluole, 2s. 7d. to 2s. 8d.; pure benzole, 1s. 9d. to 1s. 10d.; 95/160 solvent naphtha, 1s. 8d. to 1s. 9d.; and 90/140 pyridine bases, about 6s.—all per gallon naked at makers' works.

Tar Products in the Provinces.

April 9.

The average prices of gas-works products during the week were: Gas-works tar, 28s. to 28s. Pitch—East Coast, 56s. 3d. to 58s. 9d. f.o.b. West Coast—Manchester, Liverpool, Clyde, 56s. 3d. to 58s. 9d.* Toluole, naked, North, 2s. 1d. to 2s. 8d. Coal-tar crude naphtha, in bulk, North, 6½d. to 6¾d. Solvent naphtha, naked, North, 1s. 5d. to 1s. 6d. Heavy naphtha, North, 10d. to 11d. Creosote, *ex* works, in bulk, North, liquid and salty, 2⅝d. to 2⅞d.; low gravity, 2¼d. to 2⅜d.; Scotland, 2¼d. to 2⅜d. Heavy oils, in bulk, North, 3⅜d. to 4¼d. Carbolic acid, 60's, 2s. 2d. to 2s. 8d. Naphthalene, £10 to £11. Salts, 55s. to 75s., bags included. Anthracene, "A" quality, 2½d. to 3d. per minimum 40%, purely nominal; "B" quality, unsalable.

* All prices for pitch are now quoted on the basis of f.o.b. In order to arrive at the f.a.s. value at any port it will be necessary to deduct the loading costs and the tolls whatever they may be.

Tar Products in Scotland.

GLASGOW, *April* 7.

New business is not too plentiful, and some price alterations have taken place during the week.

Crude gas-works tar.—The actual value is 35s. to 37s. per ton *ex* works.

Pitch.—Price is nominal at 50s. per ton f.o.b. Glasgow for export, while in the home market value is 45s. to 47s. 6d. per ton *ex* works in bulk.

Refined tar.—There are numerous offers out and quotations are round 3d. to 3¼d. per gallon f.o.r. naked.

Creosote oil.—This market continues strong. B.E.S.A. Specification is 4d. to 4¼d. per gallon; low gravity, 4d. to 4¼d. per gallon; and neutral oil, 4d. to 4¼d. per gallon; all in bulk *ex* works.

Cresylic acid.—While new business is scarce prices remain fairly steady. Pale, 97/99%, is 1s. 1d. to 1s. 2d. per gallon; dark, 97/99%, 11d. to 1s. per gallon; and pale, 99/100%, 1s. 3d. to 1s. 5d. per gallon—all f.o.r. in buyers' packages.

Crude naphtha is scarce with value steady at 4¾d. to 5¼d. per gallon, according to quality and quantity.

Solvent naphtha.—90/160 grade is 1s. 4½d. to 1s. 5d. per gallon; while 90/190 grade is 8½d. to 9½d. per gallon.

Motor benzole.—Available supplies command 1s. 6d. to 1s. 7d. per gallon.

Pyridines.—Prompt supplies are scarce. 90/160 grade is 5s. to 5s. 3d. per gallon, and 90/140 grade is 5s. 6d. to 6s. per gallon.

Benzole Prices.

These are considered to be the market prices for benzole at the present time:

	s.	d.		s.	d.	
Crude benzole	0	9	to	0	9½	per gallon at works
Motor "	1	4	"	1	4½	" " "
90% "	1	4½	"	1	5	" " "
Pure "	1	7½	"	1	8	" " "

Contracts Advertised To-Day.

Carbonizing Plant.
Ilkley Gas Department. [p. 101.]

Coal.
Wigan Gas Department. [p. 101.]

Coke Storage, Grading, and Screening Plant.
Stretford and District Gas Board. [p. 101.]

Condensers.
Stretford and District Gas Board. [p. 101.]

Engine and Exhauster.
Stretford and District Gas Board. [p. 101.]
Leigh (Lancs.) Gas Department. [p. 101.]

General Stores.
Spenborough Gas Department. [p. 101.]

Mantles.
Spenborough Gas Department. [p. 101.]

Meters.
Spenborough Gas Department. [p. 101.]

Pipes and Specials.
Spenborough Gas Department. [p. 101.]

Station Governor.
Biddulph Urban District Council. [p. 101.]

Trade Notes.

"Simplex" Water Gas Plant for Monifieth.

The Monifieth Gas Department have placed an order with the Vertical Gas Retort Syndicate, Ltd., of 17, Victoria Street, Westminster, for an improved type "Simplex" water gas plant complete with duplicate turbo-blowers and water gas plant house.

Floodlighting by Gas.

An illustrated leaflet published by Messrs. Wm. Sugg & Co., Ltd., of Chapter Street, Westminster, S.W. 1, gives details of the firm's parabolic gas floodlamps of the type first used to illuminate the flower beds in St. James's Park during the International Illumination Congress in 1931. Particulars are also included of a powerful gas spot-light for concentrated lighting of definite objects and the "Rochester" lamp fitted with scoop reflector for mounting on columns.

STOCK AND SHARE LIST.

Official Quotations on the London and Provincial Stock Exchanges.

Issue. £	Share.	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations. April 7. (Provincial Exchanges April 6.)	Rise or Fall on Week.	Transactions. Lowest and Highest Prices During the Week.
1,551,868	Stk.	Oct. 2	7	7	Alliance & Dublin Ord. ...	130—140	...	138½—138¾
374,000	,,	Jan. 8	4	4	Do. 4 p c. Deb. ...	90—100	...	...
557,655	,,	Mar. 5	7	7	Barnet Ord. 7 p.c.	165—170	...	167
300,000	1	Oct. 23	1/9⅔	1/4⅔	Bombay, Ltd.	27/—29/-	...	...
178,480	Stk.	Feb. 19	9½	9½	Bournemouth sliding scale	197—207	...	...
550,050	,,	,,	7	7	Do. 7 p.c. max. ...	162—167	...	...
439,160	,,	,,	6	6	Do. 6 p.c. Pref ...	142—147	...	144
50,000	,,	Dec. 18	3	3	Do. 3 p.c. Deb. ...	79—84	+2	80½—84
262,025	,,	,,	4	4	Do. 4 p.c. Deb. ...	101—106	...	...
335,000	,,	,,	5	5	Do. 5 p.c. Deb. ...	120—125	...	...
357,900	,,	Mar. 5	7½	7½	Brighton, &c , 6 p.c Con. ...	161—166	...	...
540,000	,,	,,	6¾	6¾	Do. 5 p.c. Con. ...	149—154	...	152—152½
195,500	,,	,,	6	6	Do. 6 p.c. B. Pref.	135—140	...	...
1,487,500	,,	Mar. 5	5	5	Bristol 5 p.c. max.	114½—115½*a*	—½	...
120,420	,,	Dec. 18	4	4	Do 1st 4 p.c. Deb. ...	101—103*a*	...	...
217,870	,,	,,	4	4	Do. 2nd 4 p.c. Deb. ...	101—103*a*	...	...
328,790	,,	,,	5	5	Do. 5 p.c. Deb.	123—125*a*	+2½	...
885,000	,,	Sept. 25	8	7	British Ord.	155—160	...	158
100,000	,,	Dec. 18	7	7	Do. 7 p c. Pref.	153—158	...	156½
350,000	,,	,,	5½	6½	Do. 5½ p.c. Pref.	106—111	...	...
120,000	,,	,,	4	4	Do. 4 p.c. Red. Deb. ...	95—100	...	...
450,000	,,	,,	5	5	Do. 5 p.c. Red. Deb. ...	107—112	...	...
160,000	,,	Jan. 8	5	5	Cambridge 5 p.c. Deb. ...	115—120	...	...
100,000	10	May 22	6	4	Cape Town, Ltd.	4½—5½	...	...
100,000	10	Nov. 6	4½	4½	Do. 4½ p.c. Pref. ...	6¾—7¾	...	...
150,000	Stk.	Dec. 18	4½	4½	Do. 4½ p.c. Deb. ...	95—100	...	...
626,860	,,	Feb. 19	6	6	Cardiff Con. Ord.	126—131	...	...
237,860	,,	Jan. 8	5	5	Do. 5 p.c. Red. Deb.	108—108	...	...
157,150	,,	Feb 19	5	5½	Chester 5 p.c. Ord.	112½—122½*b*	...	...
98,936	1	Oct. 9	2/-	2/-	Colombo, Ltd. Ord.	1⅞—1⅞	...	...
24,500	1	,,	1/4⅔	1/4⅔	Do. 7 p.c. Pref. ...	19/—21/-	...	...
609,204	1	Mar. 19	/11'48	/11'48	Colonial Gas Assn. Ltd. Ord.	4⅜—4¾*	...	...
296,053	1	,,	1/8'30	1/8'30	Do. 8 p.c. Pref.	22/6—24/6*	...	...
1,775,005	Stk.	Feb. 19	5	5½	Commercial Ord.	120—126	...	...
475,000	,,	Dec. 18	3	3	Do. 3 p.c. Deb. ...	77—82	...	...
286,344	,,	Mar. 5	5	5	Do. 5 p.c. Deb. ...	119—124	...	...
807,560	,,	Feb. 19	7	7	Croydon sliding scale ...	152—157	...	156—157
569,590	,,	,,	5	5	Do. max. div.	105—110	+2	107—109
620,385	,,	Jan. 8	5	5	Do. 5 p.c. Deb.... ...	121—126	+1	124½
542,270	,,	Mar. 5	7	10	Derby Con.	175—180*a*	...	...
55,000	,,	Jan. 8	4	4	Do. 4 p.c. Deb.	98—100*e*	...	...
209,000	,,	Feb. 19	5	5	East Hull Ord. 5 p.c. ...	106—111	...	...
181,625	,,	Mar. 5	6	6	East Surrey Ord. 5 p.c. ...	126—131	...	...
175,509	,,	Dec. 18	5	5	Do. 5 p.c. Deb.	115—120	...	...
1,092,180	,,	Sept 25	17	16	European, Ltd.	123—133	—2	123
19,343,763	,,	Feb. 19	5⅝	5⅝	Gas Light & Coke 4 p.c. Ord.	25/6—26/6*f*	...	25/10½—26/3
2,600,000	,,	,,	3⅝	3⅝	Do. 3½ p.c. max.	87—90	...	88—89½
4,477,106	,,	,,	4	4	Do. 4 p.c. Con. Pref. ...	105—106	...	105—106
6,102,497	,,	Dec. 18	3	3	Do. 3 p.c. Con. Deb. ...	84—87	...	85—86½
3,643,770	,,	,,	5	5	Do. 5 p.c. Red. Deb. ...	116—119	...	118⅝
3,500,000	,,	,,	4½	4½	Do. 4½ p.c. Red. Deb. ...	113—116	...	114½—115¾
270,466	,,	Mar. 5	6	6	Harrogate New Cons. ...	125—130	...	...
82,500	,,	Mar. 5	7	7	Hastings & St. L. 5 p.c. Conv.	147—152	...	...
258,740	,,	,,	5½	5½	Do. 3½ p c. Conv.	115—120	...	118
140,000	1	Oct. 9	110	1/7½	Hongkong & China, Ltd. ...	29/—32/-	...	...
218,200	Stk.	Mar. 5	6	6	Hornsey Con. 3½ p.c. ...	128—133	...	...
5,600,000	,,	Nov. 6	14	10	Imperial Continental Cap.	206—211	...	206½—209
223,130	,,	Feb. 5	3½	3½	Do. 3½ p.c. Red. Deb.	89—94	...	...
235,342	,,	Mar. 5	8½	8½	Lea Bridge 5 p.c. Ord. ...	169—174	...	171—173
2,167,410	,,	Mar. 5	6	6	Liverpool 5 p.c. Ord. ...	129—131*b*	—2	...
245,500	,,	Dec. 18	5	5	Do 5 p c. Red. Pref. ...	101—111*b*	...	...
306,083	,,	July 17	4	4	Do. 4 p.c. Deb. ...	101¼—108¼*b*	...	...
165,736	,,	Feb. 19	8	10	Maidstone 5 p.c. Cap. ...	180 - 190	...	...
56,176	,,	Jan. 8	3	3	Do. 3 p.c. Deb. ...	72—77	...	...
75,000	5	Dec. 4	†10	†10	Malta & Mediterranean ...	9—11	...	...
392,000	—	Apl. 3	5½	5½	Metropolitan (of Melbourne) 5½ p.c. Red. Deb.	96—101*	—2	...
231,978	Stk.	Feb. 19	5	5	M. S. Utility "C." Cons. ...	113—118	...	...
818,657	,,	,,	4	4	Do. 4 p.c. Cons. Pref.*g*	95—100	...	...
360,075	,,	Jan. 8	4	4	Do. 4 p.c. Deb. ...	100—105	...	...
148,955	,,	,,	5	15	Do. 5 p.c. Deb. ...	117—122	...	...
675,000	,,	31 May '31	16	6	Montevideo, Ltd.	60—70	...	61—62
2,061,315	,,	Mar. 5	5	5½	Newcastle & Gateshead Con.	25/9—26/3*d*	...	...
682,856	,,	,,	4	4	Do. 4 p.c. Pref. ...	99—101*d*	...	...
776,706	,,	Jan. 8	3½	3½	Do. 3½ p.c. Deb. ...	92—98*d*	+1½	...
277,285	,,	Nov. 6	5	5	Do. 5 p.c. Deb. '43 ...	105—107*d*	...	...
274,000	,,	Feb. 19	5	5	Newport (Mon.) 5 p.c. max.	106—108*a*	+3	...
204,940	,,	Mar. 19	7½	7½	North Middlesex 6 p.c. Con.	155—160*	...	...
396,160	,,	Feb. 5	5	5	Northampton 5 p.c. max. ...	99—104	...	...
300,000	,,	Dec. 4	7	†9	Oriental, Ltd.	147—152	...	...
316,617	,,	Dec. 18	8	8	Plym'th & Stonehouse 5 p.c.	165—170	...	171
504,416	,,	Feb. 19	8	8	Portsm'th Con. Stk. 4 p.c. Std	168 - 173	...	...
241,446	,,	,,	5	5	Do. 5 p.c. max. ...	105 - 110	...	...
114,000	,,	Feb. 19	5	5	Preston 5 p.c. Pref.	103—108	...	...
686,312	,,	Jan. 22	4	4	Primitiva 4 p.c. Rd. Db. 1911	87—92	...	90
389,813	,,	Dec. 18	4	4	Do. 4 p.c. Cons. Deb.	88—93	...	...
150,000	10	Mar. 19	6	6	San Paulo 6 p.c. Pref. ...	7—8*	+½	8
1,736,968	Stk.	Mar. 19	6	6	Sheffield Cons.	135—137*e*	...	...
95,000	,,	Jan. 8	4	4	Do. 4 p.c. Deb.	94—98*e*	...	...
133,201	,,	Feb. 19	8½	5	Shrewsbury 5 p.c. Ord. ...	135—140	...	...
90,000	10	June 13	15	14	South African	3—5	...	...
6,709,895	Stk.	Feb. 19	5	7	South Met. Ord.	130—138	...	130—139
1,135,812	,,	,,	6	6	Do. 6 p.c. Irred. Pf.	138—143	...	141—141½
850,000	,,	,,	4	4	Do. 4 p.c. Irred. Pf.	102—106	...	...
1,895,445	,,	Jan. 8	3	3	Do. 3 p.c. Deb. ...	84—87	...	85½
1 000,000	,,	Jan. 22	5	5	Do. 5 p.c. Red. Deb.	114—117	+2½	115
209,820	,,	Mar. 5	8½	8½	South Shields Con.	166—167*d*	...	...
1,543,795	,,	Feb. 19	6	6	South Suburban Ord. 5 p.c.	128—133	—1	129—130½
512,825	,,	,,	5	5	Do. 5 p.c. Pref.	115—120	+1	119½
300,000	,,	,,	—	4	Do. 4 p.c. Pref.	103—108	+5	104½—105
868,837	,,	Dec. 18	5	5	Do. 5 p.c. Deb.	120—125	...	...
100,000	,,	,,	4	4	Do. 4 p.c. Deb.	103—108	+4	105
647,740	,,	Mar. 5	5	5	Southampt'n Ord. 5 p.c. max.	109—114	...	...
121,275	,,	Dec. 18	4	4	Do. 4 p.c. Deb.	100—105	...	...
350,000	,,	Mar. 5	5½	5½	Swansea 5½ p.c. Red. Pref.	106—111	...	110½
200,000	,,	Dec. 18	6½	6½	Do. 6½ p.c. Red. Deb.	103—108	...	105—106
1,076,490	,,	Mar. 5	6½	6½	Tottenham and District Ord.	148—153	...	...
409,835	,,	,,	5½	5½	Do. 5½ p.c. Pref. ...	128—128	...	128
62,235	,,	,,	5	5	Do. 5 p.c. Pref. ...	112—117	+2	...
199,005	,,	Dec. 18	4	4	Do. 4 p.c. Deb. ...	97—102	...	...
85,701	,,	Oct. 9	6	6	Tuscan, Ltd. 6 p c. Red. Db.	90—100	...	98—99
349,110	,,	Mar. 5	7	7	Uxbridge, &c., 5 p.c. ...	147—152	...	152½
88,330	,,	,,	5	5	Do. 5 p.c. Pref. ...	112—117	+2	113½
1,322,220	,,	Mar. 5	7	7	Wandsworth Consolidated	155—160	...	156—159
1,096,373	,,	,,	5	5	Do. 5 p.c. Pref.	118—123	+1	120½
1,317,964	,,	Dec. 18	5	5	Do. 5 p.c. Deb.	120—125	...	123
158,400	,,	Mar. 5	5	6*g*	Winchester W. & G. 5 p.c. Con.	115—120	...	...

Quotations at:—*a*.—Bristol. *b*.—Liverpool. *c*.—Nottingham. *d*.—Newcastle. *e*.—Sheffield. *f*.—The quotation is per £1 of stock. *g*.—Paid £5, including 10s. on account of back dividends. * Ex. div. † Paid free of income-tax. ‡ For year. Hongkong & China, Ltd.—paid on £10 shares.

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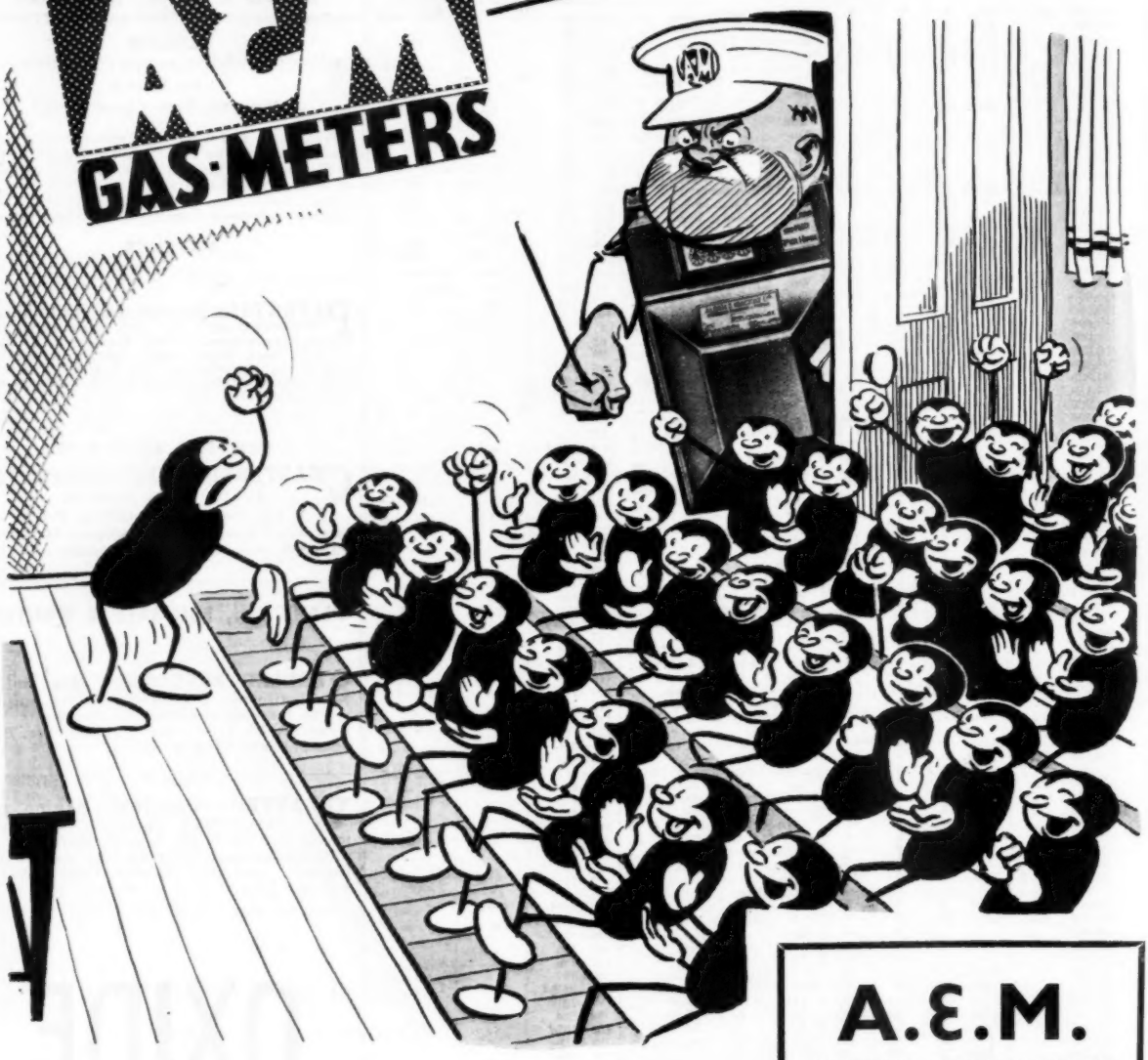

Theo the therm had the meeting with him when he was expatiating on his favourite topic, "more freedom for therms," but he wilted under the Sergeant's eagle eye. "It's all just GAS," he muttered, "we know YOU control the therms."

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These meters are designed and constructed for long and exacting service under modern conditions. Pressure losses at capacity are unusually small and registration is precise over a very large range.

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